



UNIVERSITY OF GHANA

AN EXAMINATION OF THE SUPPLY CHAIN OF CASHEW IN GHANA. A CASE

STUDY OF THE UPPER WEST REGION

BY

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**A THESIS SUBMITTED TO THE DEPARTMENT OF OPERATIONS AND
MANAGEMENT INFORMATION SYSTEMS (OMIS), UNIVERSITY OF GHANA
BUSINESS SCHOOL, LEGON, IN PARTIAL FULFILMENT OF THE REQUIREMENT
FOR THE AWARD OF MASTER OF PHILOSOPHY IN OPERATIONS
MANAGEMENT.**

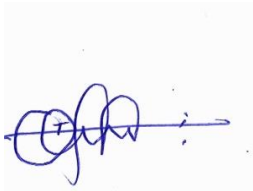


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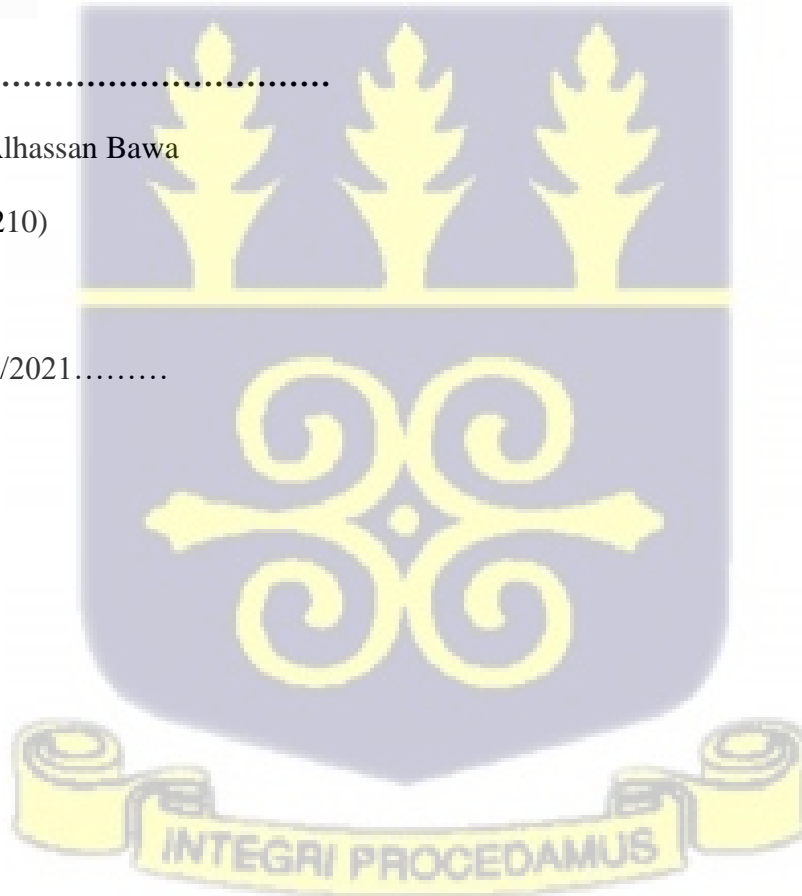
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CERTIFICATION

This thesis has been submitted for examination with our approval as supervisors.



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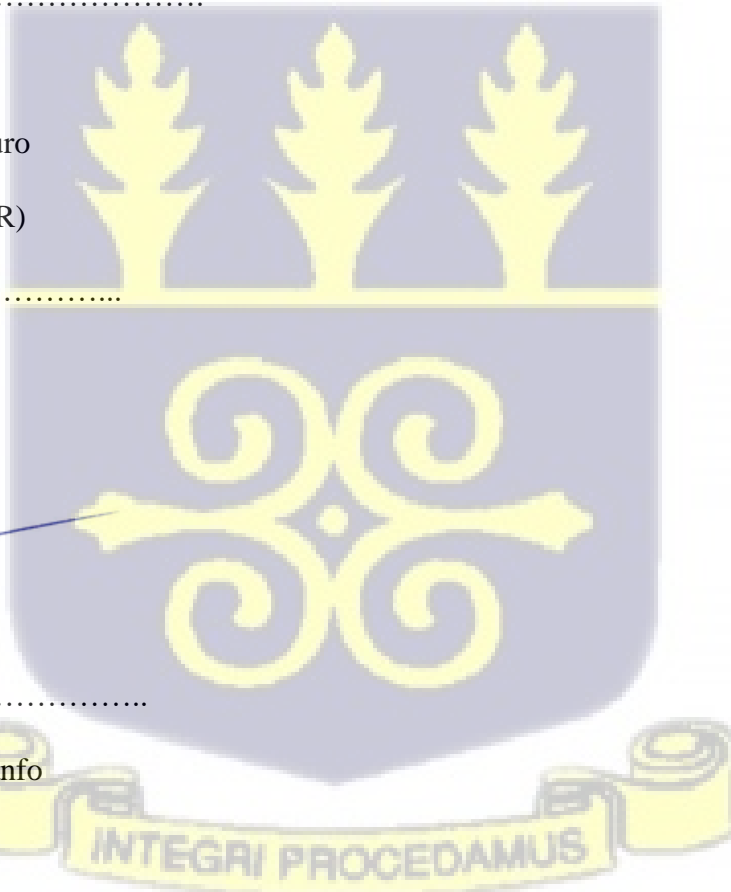
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DEDICATION

This work is dedicated to my parents, family and friends



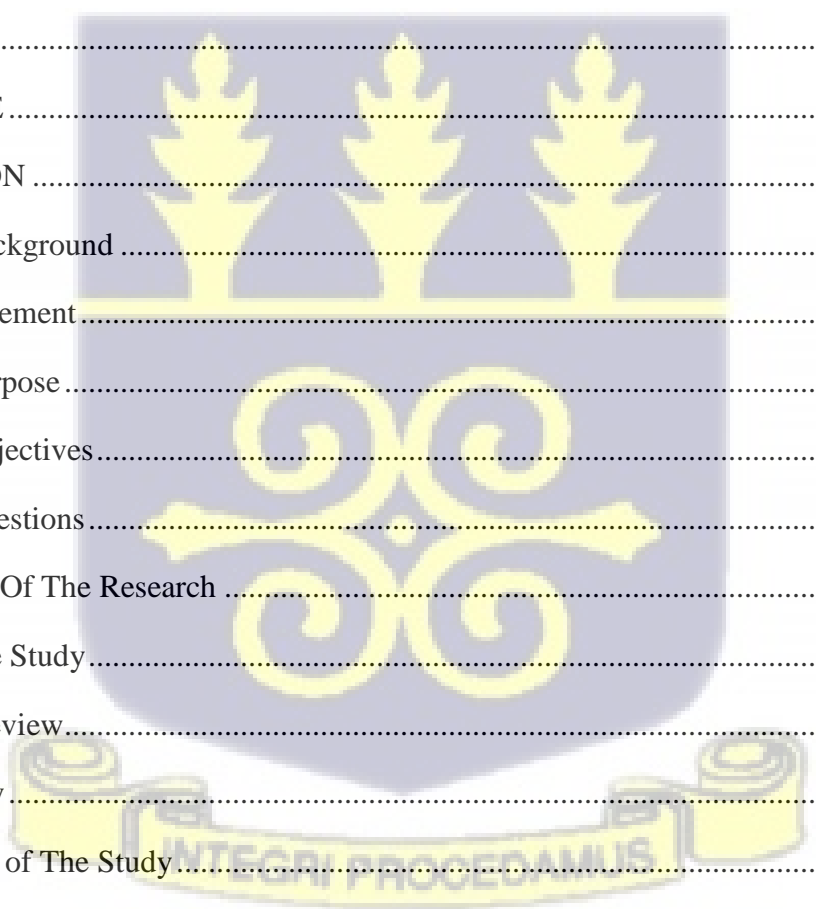
ACKNOWLEDGEMENT

Amidst the tides through a journey there is always an assurance of the LIGHT. My utmost appreciation goes to God Almighty for being with me from the beginning to the end and still is. This piece however, will not have been possible without the council, guidance, and directions of my supervisor. I cannot quantify how grateful I am to you and words cannot even express your relentless efforts to constantly keep me on the right path. May the good Lord continue to rest his faithful hand upon you and all you do. To my course instructors throughout my program, I appreciate the knowledge and skills you impacted unto me. And to all my friends for your support and inspirations, I am grateful.



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LIST OF ACRONYMS AND ABBREVIATIONS.

NTES	Non-Traditional Export Sector
PERD	Planting for Export and rural development
GSOP	Ghana Social Opportunities Project
CRI	Crops Research Institute
SARI	Savanna Agricultural Research Institute
CRIG	Cocoa Research Institute of Ghana
UDS	University for Development Studies
CIAG	Cashew Industry Association of Ghana
KG	Kilogram
COVID-19	Coronavirus- 2019
GDP	Gross Domestic Product
ERP	Economic Recovery Program
RCN	Raw Cashew Nut
GEPC	Ghana Export Promotion Council
MOFA	Ministry of Food and Agriculture
ADRA	Adventist Development and Relief Agency
CCG	Cashew Council Ghana
HA	Hectares
MM	Millimeters
GEPA	Ghana Export Promotion Authority
t	Tons
ACPG	Association of Cashew Processors Ghana



TCDA	Tree Crop Development Authority
ACA	African Cashew Alliance
CNSL	Cashew Nut Shell Liquid
NGO	Non-Governmental Organization
SNI	Sustainable Nut Initiative
TBL	Triple Bottom Line
SAPIP	Savannah Agricultural Productivity Improvement Project
SCOR	Supply Chain Operations Reference
SMS	Short Message Service
ICT	Information Communication Technology
3S	Standard Sharing Software



ABSTRACT

This research is to examine the state of the cashew nut supply chain in Ghana, thus from production to consumption using the Upper West Region as a case study. To have an in depth understanding of all actors along the cashew nut supply chain, a qualitative research approach was adopted. The cashew nut supply chain comprised of cashew farmers, middlemen or aggregators and cashew exporting companies. The method of data collection used in this paper included semi-structured interviews and observations and was carried out with the use of detailed interview guides administered to a selected sample of each population (farmers, aggregators, and exporters) to participate in the study. Five communities in the Dafiama-Bussie-Issa district were selected for the study. The various sample sizes included 50 farmers, 10 Middlemen or Aggregators, and 1 official from each of the exporting companies, giving a total sample size of 62 participants employed in the study. After having recognized the economic potential of cashew nuts the government of Ghana implemented an economic recovery program in the 1990s to revamp the cashew sub sector in Ghana. Since then, cashew nuts have undoubtedly contributed massively to the socio-economic wellbeing of people who are into the cashew business and especially amongst small holder cashew farmers. Reduction in poverty, creation of employment especially for women, increase in income amongst others are some of the advantage's cashew farmers and other actors in the supply chain benefit from this cash crop. The Ministry of food and agriculture carried out a research to identify potential areas in Ghana with arable land suitable for the production of cashew nuts and they included Brong Ahafo, Bono East, Northern region, Volta and the Upper west region, to mention a few. However, production of cashew nuts in the Bono east and Ahafo regions have been buoyant, hence these regions are considered the hub of Ghana's cashew nuts. Yet Ghana is unable to meet demand in the international market,

though other regions in the country have been marked as potential cashew growing areas. The research revealed that cashew farmers from the Upper West Region are facing some difficulties and that is hampering their production of cashew nuts. They mentioned issues of lack of storage, Extension service Officers, ineffective cashew plants and so on. However, one major challenge that was common among all three populations was the issue of pricing. Nevertheless, some recommendations on how to improve operations and as such increase production of cashew nuts were made. One of the exporting companies beckoned on government to resource the Tree Crop Development Authority to make it actively operational so that issues especially relating to price instability can be curbed. The research is organized in seven chapters: introduction of the study, context of the study, literature review, methodology, data analysis and presentation, discussions and finally, conclusions and recommendations respectively.



CHAPTER ONE

INTRODUCTION

1.0 Research Background

Agriculture has for many decades been the dominant sector of the economy of Ghana, due to its contribution to gross domestic product, labor absorption and foreign exchange earnings. Over the past few decades, the cashew nuts have emerged as a valuable commodity with increasing economic potential. Increasingly, the Ghanaian market is recognizing the potential of the cashew crop. Cashew, (*Anacardium occidentale* Linn.) mostly referred to as “wonder nut”, is a tree crop grown in some parts of the world, especially in countries with warm climatic conditions. Cashews are classified in three different types: grafted, hybrid, and local each with its defining properties. Most farmers in Ghana are usually advised to grow the grafted cashew for commercial purposes, and this is preferred because of the high yielding capacity of this variant. As an ingredient it can be found in many local herbal products. The export volumes of cashew have doubled over the years from 800,000 metric tons in 2009 to 1.7 million metric tons in 2020 (AgricToday, 2020). Countries like Vietnam, India, and Brazil are engaged in large scale cashew production and export. In Africa, countries such as, Ghana, Tanzania, Cote d’Ivoire, Burkina Faso, Benin, Mozambique, to mention a few, are involved in cashew production. Cashew is also known for its many useful properties and medicinal benefits.

Current world market demand for cashew exceeds the pace of expansion of production. It is estimated that the difference is about five percent per year (ADF, 2000). This situation creates an opportunity for Ghana which has vast cashew suitable lands stretching about 3.27 million

hectares in eight regions of Ghana. Ghana's cashews are rated among the best in the world according to the Ghana Export Promotion Authority. However, the long-term neglect of cashew in favor of cocoa production has left Ghana struggling to compete for global cashew market worth billions of US dollars (ADF, 2000). But that notwithstanding, the past fourteen years in Ghana have been faced by relentless government efforts to bring the economy to restitution through various structural reforms recommended and supported by donor agencies, particularly the World Bank and the International Monetary Fund (Bank of Ghana, 2007 cited in CDP (2008). The Non-Traditional Export Sector (NTES) has been given attention in economic development due to persistent deterioration in the terms of trade for the country's major or traditional exports – cocoa, timber, and minerals (gold, diamond, bauxite and manganese) (Bank of Ghana, 2007 cited in CDP, 2008). For example, the cashew sub-sector grew at 30 per cent in value to US\$1,164.5 million in 2007, from US\$892.9 million in 2006. Cashew is one of the agricultural products with the greatest potential for increasing foreign exchange and employment.

The economic potential of the commodity, and the state of the cashew sub sector in Ghana with specific reference to the Upper West Region, informed the intention to engage in this research. Cashew farming is very sustainable in Ghana because the crop requires attention for the first two years only, after which it is able to survive on its own. Thus, it only requires periodic ploughing, weeding, and spraying to control pests.

Cashew nuts takes a maximum of four years to fruit and after which the Farmer can harvest each year. The productive life of the tree spans up to forty years. The study examines the cashew sub-sector in Ghana, and addresses the operational challenges associated with the supply chain. It also explores innovative ways to improve the operational efficiency of the cashew sub-sector, and to assess creative ways of marketing the product both locally and abroad.

1.1 Problem Statement

Most people in the Upper West region of Ghana are predominantly into agricultural related activities. The contribution of agriculture to the socio-economic development of the region cannot be underestimated. But production in the sector is incessantly negatively affected by variable weather conditions characterized by frequent floods and droughts, erosion and poor soils among several limiting factors (Apusigah, 2016).

The cashew crop apart from shea nuts, has been identified as the only commercial crop in the region and also because of its tremendous contributions towards enhancing the socio-economic wellbeing of the people. The impact of cashew in the Upper West region and parts of northern Ghana in general is evident in rural income and employment, especially for rural women, amongst several benefits. Cashew has thus been identified as one of the non-traditional crops that has the potential to generate foreign exchange for the country (Bank of Ghana, 2007 cited in CDP (2008).

Amidst the contributions of cashew to the Ghanaian economy, there exist some alarming challenges if not addressed will not only cause a total decline of the sector but affect the country's economic growth and deprive the source of income for the people especially in the communities. Cashew Farmers in Ghana have overtime advocated for a more reliable, faster, responsive and transparent supply chain of cashews thus, from farm to market. This will ensure efficiency and effectiveness of the industry especially in times of unexpected crisis such as the COVID-19 pandemic currently ravaging the country (Sylvia, 2020).

The Daffiama Bussie district, in the Upper West region, was the first to embrace Ghana's initiative of Planting for Exports and Rural Development (PERD) to raise and distribute over thirty-five thousand cashew seedlings supplied by Ghana Social Opportunity Project (GSOP) to farmers

(Mark, 2020). However, high yield of cashew from the region is still very low not because there are no arable and available land for its cultivation but because of bottlenecks at every stage of the supply chain. In the area of production, due to the lack of education and training of farmers, higher yields and good quality cashews are almost impossible to achieve. This is largely because various assemblies and stakeholders in the communities who are to ensure that farmers are given the requisite skills and knowledge to enable farm efficiency do not invest in trainings and practices for farmers, hence they have no knowledge on the appropriate kinds of seedlings to transplant. Furthermore, chemicals to control insects' infestation and diseases, generally good Agric practices to ensure healthy growth of their cashew and the accessibility of moderate credit facilities or funding to ensure that farmers cultivate and produce large quantities of cashews are some of the drawbacks to cashew production. The issue of irrigation is also of high concern to cashew farmers. Considering the harsh weather conditions during the harmattan or dry season in the region, farmers usually face challenges in sustaining the plants. This is as a result of ineffective irrigational systems to efficiently maintain and keep alive the plants during the season. This will also result in a good number of the plants dying off, attracting another cost for the farmer to undertake replacement the following year. Bushfire during this season is prevalent because there are no appropriate fire belts created to enhance safety and growth of plants. Other issues with the cashew production in the region include harvesting and storage facilities.

Unlike Cocoa and coffee, very little research has been undertaken on cashew in Ghana. However, with increasing attention on cashew production, some institutions have embarked on research activities, and they include, Crop Research Institute (CRI), Savannah Agriculture Research Institute (SARI), University for Development Studies (UDS), and Recently, Cocoa Research Institute of Ghana (CRIG) has initiated research on cashew and shea-nut, as priority crops (ADF,

2000). Available literature has also concentrated on the cashew sub sector with all its intricacies in the Brong Ahafo region, specifically Wenchi. But not much have been done for the Upper West Region. This study therefore seeks to examine the entire state of the cashew sub-sector, addressing especially its challenges with regards to the supply chain.

1.2 Research Purpose

The overall objective is to examine the supply chain of cashew in Ghana

1.3 Research Objectives

Specific objectives include:

1. To ascertain the processes involved in the cashew nuts supply chain in the Upper west region
2. To identify the challenges involved in the production and marketing of cashew nuts in the Upper West region
3. To recommend a supply chain model on how the operations management of the supply chain of cashew nuts can be improved to maximize profit.

1.4 Research Questions

In view of the above, this research project seeks to answer the following questions:

1. What are the processes involved in the cashew nut supply chain in the Upper West region?
2. What are the challenges involved in the production and marketing of cashew nut in the Upper West region?

3. In what ways can the operations management of the supply chain of cashew nut be improved, in order to maximize profit?

1.5 Significance Of The Research

It is envisaged that the research findings will provide a snapshot of the operational processes involved in the cashew sub-sector in Ghana. The study will also evaluate the local economic impact of the sector, as well as the export earnings potential of the commodity. The findings are expected to identify problem areas in the supply chain and to help provide solutions and recommendations to improve the existing processes.

It is hoped that the final document will contribute to existing knowledge of the cashew sub sector in Ghana, and with regards to application, the study will provide directions on issues pertaining to the cashew sub-sector for organizations such as but not limited to the Ghana Export Promotion Authority, Tree Crop Development Authority and Cashew Industry Association of Ghana as well as influence government policy in the sector. The results of the study will also support in improving skill conditions of the cashew farmers in various cashew growing regions in the country.

1.6 Scope of The Study

The study will be carried out in selected cashew growing communities in the Dafiama-Bussie Issa district of the Upper West region of Ghana. This is because, according to (Mark, 2020) the district has the most cashew Farmers under the Planting for Export and Rural Development (PERD) whereas 9,000 cashew seedlings were distributed to 80 Farmers in the Jirapa municipality, the area with least production. Hence the study will be able to make meaningful generalized conclusions. The study will focus on individual Farmers, Regional division of Cashew Industry Association of

Ghana (CIAG), some exporters of cashew nuts and Aggregators. These specific population are deemed appropriate because they are the stakeholders of the cashew sector and the primary source of information.

1.7 Literature Review

This examines research and available literature that have been undertaken regarding the cashew industry, specifically in Ghana and other cashew growing countries. Also, general information regarding best practices in order to enhance Ghana's cashew sub-sector. The other aspects of the research area to be reviewed include soil type, amount of rainfall needed, types of the cashew plant, uses of the cashew plant, processing of the cashew nuts and apple, sources of funding and the technology employed in the cashew supply chain.

1.8 Methodology

For the purposes of this study, it is proposed that a qualitative research methodology will be adopted. This research approach is deemed appropriate because it will enable the researcher collect information from multiple stakeholders in order to facilitate accurate understanding of the subject. The data collection methods, that is, either secondary or primary information, will be in the form of semi-structured interviews and observations of supply chain activities. The data collection instruments will be in form of interview guides that will be administered to selected participants across five selected communities in the Daffiama-Bussie-Issa district as well as some selected exporters of cashew nuts in Ghana. It is proposed that the researcher will carry this out by engaging persons involved in the cashew value chain, which includes Farmers, Aggregators, Extension

officers from the district Agric office, nursery operators, and associations such as: Cashew Industry Association of Ghana in the Upper West.

Secondary information will also be retrieved from useful websites, such as: The Ghana Export Promotion Authority, Exim bank, Ministry of Food and Agriculture, Alphonsa Cashew Industry, as well as other relevant sources suitable for the study. Responses or feedback that will be derived from the various medium of sourcing information will be analyzed using a qualitative data analysis technique known as Miles and Huberman's data analysis technique.

1.9 Organisation of The Study

The research paper is organized in seven different chapters:

Chapter One: gives the outline of the research and it covers the study background, problem statement, research purpose, objectives of the study, research questions, significance of the study, scope of the study and organization of the research.

Chapter Two: provides the context of the study where the role of agriculture in the Ghanaian economy will be presented. Particular emphasis on the cashew crop will be discussed.

Chapter Three: presents the literature review which will entail relevant literature to the study, theories and models that form the foundation of cashew supply chain will be identified, and how the theories are related and can be adopted to the present study.

Chapter Four will contain the methodological approach that identifies the research strategy, sampling techniques, instrument for data collection, method used, and the data processing and analysis.

Chapter Five: The data presentation and analysis.

Chapter Six: The discussion of the results.

Chapter Seven: will contain the conclusions, suitable recommendations, and future research directions.



CHAPTER TWO

CONTEXT OF THE STUDY

2.0 Introduction

This chapter presents an overview of the study area, an in-depth knowledge and understanding of the cashew crop in Ghana and a general overview of Ghana's Agriculture sector.

2.1 Overview of study Area

The study was carried out in the Daffiama-Bussie-Issa district in the Upper West region of Ghana. Daffiama-Bussie-Issa district is one of the newly created forty-six district in the Upper West region and founded on the 28th of June, 2012 (Aniah & Kpentey, 2014). Most people in the district are predominantly into agriculture and the native language spoken is dagare. Daffiama-Bussie-Issa District was carved out of the erstwhile Nadowli District in 2012 through Legislative Instrument LI 2100 with Issa as the capital (Aniah & Kpentey, 2014). It is located in the center of the Upper West Region, and lies approximately between latitudes 11°30' and 10°20' North and longitudes 3°30' and 2°10' West (Aniah & Kpentey, 2014). Daffiama-Bussie-Issa district is bordered to the south by Wa municipal, west and north by the Kaleo-Nadowli and Sissala west districts respectively and to the east by Wa east district. It covers a total land area of 1,315.3 square kilometers and extends from the Billi Bridge thus four kilometers from Wa to Dapuori Bridge which is almost twenty-eight kilometers from Nadowli on the main Wa to Tumu Road and also from west to east it extends from the black Volta to Daffiama. Issa, the district capital, is 57 kilometers from the regional capital, Wa (Aniah & Kpentey, 2014).

2.2 Role of Agriculture In The Ghanaian Economy

Ghana's agricultural sector has been growing rapidly and regarded as a foundation for sustainable livelihood for most rural dwellers, since most of Ghana's produce is obtained from various rural communities who are usually smallholder farmers. Presently, the sector contributes 19.7% of Ghana's Gross domestic product (GDP) and accounts for over 30% of export earnings, and serve as a primary source of inputs to various manufacturing industries. In 2019, 33.5% of the labor force was estimated to have been employed in the sector making it the second largest employer in the economy; nevertheless the smallest sector in comparison to the services and industry sector (Plantwise et al., 2020).

Ghana's agricultural sector is classified into five main subsectors namely: food crops, livestock, fisheries, cash crops and forestry. The objective of the sector is to ensure food security and facilitate the production of agricultural raw materials for industry and agricultural commodities for export (Ulypyg, 2005). Good quantities and varieties of crops are cultivated in various regions of the country even though the industry is crippled with certain challenges such as: insufficient funds considering the fact that a large population of the farmers are rural dwellers, access to arable land, limited technological machinery, if even available are expensive, inconsistent training of farmers to acquire the necessary skill and expertise, amongst others. These challenges sometimes hinder effective agricultural production.

Maize is the dominant crop grown in most parts of the country. Some other crops include yam, cassava, plantain, sorghum, plantain, millet and rice. These crops are estimated at 1.5 to 1.8 million tons per year (Plantwise et al., 2020). We also have vegetables such as, tomatoes, pepper, onion, okra, cabbage, and garden eggs which are lucrative sources of income. Meanwhile, the cultivation of pineapples and fruit trees especially mango, orange, and cashew have increased in recent years

especially within smallholder farmers , due to their income generating power (African Development Fund, 2000).

However, since the inception of the coronavirus, (COVID-19) on March 2020 in Ghana, most economic activities in the country have been disrupted and halted leading to high cost of living, limited food supply, and stunted livestock growth and so on. For instance, the farm gate price of maize which sold at GH¢120 or less per 100kg (Kilogram) previously, was sold at GH¢170 in 2020. The hike in prices made it difficult for people to purchase because some extra cost such as transportation, loading, and so forth before it reaches the final destination had to be factored in. The cashew sub sector is one of the areas that could boost the country's economy due to its high foreign exchange earnings and its potential to overtake cocoa.

2.3 History of The Cashew Crop In Ghana And Some Government Interventions

The cultivation of the cashew crop became prominent in Ghana in the early 1960s but became dormant because farmers had no knowledge about the high economic potential of cashew crop and it was cultivated mainly for afforestation purposes and control desertification. But Ghana embarked on an Economic Recovery Program (ERP) in the early 1990s to revive farmer's interest in cashew production. The cashew crop was then considered a suitable export crop and was also an opportunity for Ghana to diversify and expand its export base because the implementation of the program led to the liberalization of commodity markets. Non-traditional export crops such as pineapple, mango and cashew, are progressively becoming relevant to the socio-economic development of Ghana, and since the cultivation of cashews, it has improved satisfactorily across the country in the last six years. This development can be attributed to the benefits that most

farmers derive from its production, and its high demand in the vibrant export market (Gyan, 2009 cited in Keller (2010).

Farmers have ever since become enthusiastic about the crop and channeled resources to restore some of the aged cashew farms that were planted in the late 1980s under the National Agro-forestry Program. This positive step made Ghana record her first raw cashew nut (RCN) export of 50 tons in 1991. By 1997, cashew exports had increased to 3,571 tons (Keller, 2010). Over 98% of cashews that are exported from Ghana are raw cashew nuts (RCN) and the remaining 2% are processed locally into roasted nuts (Ashitey, 2012). This makes Ghana the second largest exporter of raw cashew nuts in the world (John et al., 2018). Some countries in the world that are into cashew production include, Ivory Coast, Mozambique, Tanzania, Burkina Faso, Brazil, India and Vietnam (the world's largest producer and exporter of cashew). In Ghana, value is usually not placed on the cashew apple because Ghana has limited fruit processing factories especially for cashew hence the apples are mostly left to waste away. Nevertheless, the government of Ghana has made efforts to set up some institutional bodies and associations to oversee affairs and coordinate matters of the cashew sub-sector to ensure its effective operation as well as to promote complete processing of cashew in the country. In effect, the Cashew development project was the first major program to be implemented in 2002. In addition, efforts were made by both public and private organizations such as: Ghana Export Promotion Council (GEPC), Agro Forestry Unit of Ministry of Food and Agriculture (MoFA), Forestry Commission, Techno Serve and the Adventist Development and Relief Agency (ADRA) respectively, to cooperate in order to harness and develop the cashew sector in Ghana (Edward, 2016).

In the past few years till date, the Government of Ghana has made cautious efforts to sustain the cashew sub-sector. Some of these interventions include: Planting for Food and Jobs, Free nursing

and distribution of cashew seedlings to farmers, Planting for Export Rural Development (PERD), Tree Crop Development Authority (TCDA), Cashew Industry Association of Ghana (CIAG) and Cashew Council Ghana (CCG). Cashews were initially cultivated in the Greater Accra, Eastern, Volta and Brong Ahafo regions until it spread to the Northern parts of the country (ADF, 2000). Nevertheless (Keller, 2010), posit that approximately more than three million hectares of arable land are available for the cultivation of cashew, especially in the Savanna and Bono East, Ahafo regions of Ghana. Cashews come in various varieties namely: local or polyclonal and grafted seedlings, each with its defining characteristics. The local variety is more nutritious and of high quality but takes longer time to flower and produce fruits. It takes between three to four years to start bearing fruits even though it is dependent on good agronomic practices. On the other hand, the grafted ones, unlike the local, yield faster, approximately two years, but less nutritious and of lower quality.

Farmers in Ghana prefer to grow the grafted seedlings for commercial purposes because of its high and fast yielding capacity and also because attention is on the nuts and not the apple. Ghana has only a few seed companies dealing with cashew such as Antika Company limited and Heritage seeds which are located in the Upper West region. As such the varieties largely grown by the farmers are unknown since the acquisition and distribution of seedlings are mostly through farmer to farmer exchange. In recent times, the government and other private companies like Olam, Ghana's leading exporter of raw cashew nut, have taken steps to address such issues by embarking on a mass free distribution of polyclonal cashew seedlings under planting for export and rural development to farmers in the various cashew growing regions in the country. They also offer training and serve as advisory for effective cashew growth and development. ADF,(2000) in a cashew development project appraisal report stated that cashew is a difficult crop which grows

well on marginal lands and identified as an ideal crop for soil conservation and afforestation, especially in Savannah areas. The crop is not grown only in the Savannah areas but also in other regions. The table below displays cashew growing areas and their various districts in Ghana.

Table 2.1 Major Cashew growing regions and their districts in Ghana

Regions	Districts
Greater Accra	Ga West, Dangbe West
Ashanti	Ejura Sekyeredumase, Sekyere West, Offinso, Sekyere East
Eastern	Afram Plains, Suhum Kraboa, Asuogyaman
Central	Gomoa, KEEA, Asikuma, Twifo Hemang
Volta	Nkwanta, Hohoe, Kpandu, Akatsi, Keta
Brong Ahafo	Jaman, Wenchi, Kintampo, Nkoranza, Techiman, Atebubu West
Northern	West Gonja, Bole, Yendi, Mamprusi
Upper East	Bawku, Builsa and Kassina-Nankena districts
Upper West	Nadowli, Jirapa-Lambussie and Sissala districts

Source: ADF, 2000



2.4 Status of Ghana's Cashew Sub-Sector

The Ministry of Food and Agriculture (MOFA) in 1998, conducted a research to study the state of the cashew sub-sector with keen interest and emphasis on the potential cashew production areas, performance, as well as challenges hampering the growth and development of the sector. Findings from the study revealed that Ghana has vast and arable lands suitable for the cultivation of cashew for commercial purposes. The study also indicated that cashew has prospects of bringing income especially among rural dwellers in order to improve standard of living thereby supporting in the alleviation of poverty (ADF, 2000).

More also, Keller (2010) assert that, Ghana has enough land to develop and expand new plantations of about 60,000 hectares by 2008 and up to 100,000 ha by 2020. Keller (2010) also indicated that Ghana has the potential to expand cashew production in 2021 and beyond. But certain factors like: competition for resources as a result of production of other cash crops, water for irrigation especially during the harmattan, and the influx of pest and disease due to poor agronomic practices, may hinder production. However, global demand for raw cashew nuts continues to surge with over two million tons from 2012 to 2013 and over three million tons from 2019 to 2020 (Evans et al., 2014). From these statistics, production of cashew in Africa needs to increase by an average of 8% each year in order to meet this demand. In the same vein, if current global demand continues to grow at current rates, African production will also need to increase by an average of 16% to meet demand (Evans et al., 2014).

The Bono East, Bono and Ahafo regions, previously known as the Brong Ahafo region, are making great progress in the production of cashew and are regarded as the hub of Ghana's cashews. These three regions produce majority of cashews for exports. This milestone has placed Ghana as one of the largest producers of raw cashew nuts in Africa (James & Kristen, 2019). This may be attributed

to favorable weather conditions appropriate for its cultivation, extensive farm activities, availability of labor and other resources and the access to credit facilities. This is unlike in the savannah areas where farm activities are mostly subsistence farming due to lack of resources, access to credit facilities among others that are impeding the high economic potential of the vast virgin lands available. Susceptibility to insect pests as a result of establishing cashew farms with unselected cashew seedlings (Dadzie et al., 2014) and other factors lead to poor yield.

Some communities in the Upper West region like Jirapa, Daffiama, Bussie, and Samanbo are increasingly engaging in the production of cashew. This action has enabled most farmers and especially women earn standard and sustainable income, and most importantly discouraged many youths from urban migration.

Cashew is grown as a tree crop in the coastal belt (Central, Greater Accra, and Volta Regions), the transitional belt (north of Ashanti, Brong-Ahafo) and guinea savanna belt (parts Northern, Upper West and East regions). The ideal rainfall pattern is between 750mm – 1300mm. Dedzoe et al., (2001) identified the various ecologies appropriate for cashew production namely: coastal Savannah, interior savannah and forest savannah transition. One soil type recommended for cashew growth is loamy. Cashew can sometimes also grow in sandy soil but compost fertilizer needs to be added to the soil for it to mature. Cashew performs poorly in areas with high rainfall patterns and moderate rich fertile soils. Hence the forest savannah transition is preferred for its cultivation. Even though this is favorable for the Upper West region, the cashew plant at its early stages need considerable amount of water to mature to a stage before it can survive on its own.

The matured cashew has an umbrella-like shape. The kidney shaped nut is the actual fruit which is attached to the apple, a juicy swollen pedicel, usually heavier than the nut when ripe (Malhotra, SK; Hubballi, VN; Nakak, 2017). It grows favorably in areas with low levels of rainfall and does

not grow effectively in areas with heavy rainfall and develops best in most parts of Ghana where the average annual rainfall is between 1000 to 1500 mm (millimeters) per year hence the Western region especially is not suitable for cashew plantation. In Ghana cashew trees blossom between November and January when the weather is dry and temperatures are high which is appropriate for a better harvest (Ashitey, 2012).

Another aspect that leads to poor yield is pest infestation caused by algae leaf spot, but can be controlled by applying fungicide. The development of cashew has contributed to the provision of employment especially for women in nursery operations and in cashew processing industries or companies. It has minimized rural poverty and migration and reduced desertification.

The Ghana Export Promotion Authority (GEPA) in collaboration with Cashew Industry Association of Ghana rolled out a ten-year Cashew Development Plan that seeks to increase annual raw cashew nuts (RCN) production from 80,000 tons in 2017 to a minimum of 300,000 tons by 2027. The project will directly engage about 248,589 farmers and indirectly benefit over 1.5 million people. This initiative is intended to harness Ghana's cashew sector. The project also plans to raise cashew processing from 5,600 tons to 300,000 tons annually, generating more than 200,000 direct and indirect jobs by the tenth year. The cashew sub-sector in Ghana has grown overtime with a number of companies, organizations and government bodies working progressively to achieve and establish a strong cashew industry as proof of a resilient economy.

2.5 Major Stakeholders In Ghana's Cashew Sub-Sector

The Government of Ghana inaugurated a ten-year development plan from 2017 to 2027 for cashew. According to the plan, land area arable and suitable for the cultivation of cashew is expected to grow from 107,000 hectares in 2017 to 297,000 hectares by 2027. The project plans

to increase cashew processing from 5,600 tons to 300,000 tons and create job opportunities of over 200,000 direct and indirect jobs annually by the tenth year as well as the processing of cashew apples, which are currently being wasted. The plan has since chalked some success in the area of training farmers to acquire good farm skills, providing jobs to especially women in the rural areas as nursery operators of cashew seedlings. Some communities that benefited from these include: Dormaa in the Bono region, Jirapa and Daffiama, Bussie and other communities across regions in Ghana.

The cashew sub-sector in Ghana can currently boast of twelve processing companies with a total installed capacity of 2,137 tons per year. However, the only medium processing company is Mim Cashews and Agricultural Products limited, which has an installed capacity of 1,000 tons per year and located at Mim in the Brong Ahafo region of Ghana (Keller, 2010). Other processing companies include but not limited to, Kona Agro processing Limited, Nafana Agro processing company and USIBRAS Ghana Limited. There are various human resources particularly those at the source of production and those handling different sections of the cashew supply chain to ensure the smooth running and growth of the cashew sub-sector.

❖ **Input Suppliers**

They are responsible for making sure that specific required inputs such as: herbicides to control weeds. Pesticides, seedlings, and fertilizers (Compost) are provided to farmers. Cashew Industry Association of Ghana (CIAG), the Upper West regional division is currently working directly with farmers in the association to ensure that they get the right inputs for cultivation. Also, cashew nurseries have been raised in most cashew growing districts under the Government Planting for Export and Rural Development, to distribute seedlings to farmers during the season. Some companies like Antika in the Upper West

region, also serve as input supplier to farmers. Companies like Olam Ghana also offer advice to farmers on good farm practices.

❖ **Cashew Producers**

The cultivation of cashew is mostly carried out by smallholder farmers who depend heavily on family labour and hired labour in rare cases for farm activities. These farmers are mostly organized in groups, which makes it easier for any company to deal directly with them, especially in the case where most of these farmers are uneducated. However, in the Upper West region, there are no such strong groups or associations. But in recent times, groups such as CIAG are making efforts to get farmers under one umbrella.

❖ **Processors**

Value addition to cashews is mainly achieved at the processing and packaging stage. The processing of cashews involves different steps, mostly carried out by different actors. But for raw cashew nuts (RCN) originating from Ghana, majority of it are exported to India, where they are then transformed into plain kernels and exported in bulk to markets in developed and emerging countries, where further processing takes place with regard to roasting, packaging, seasoning or salting and branding.

Nevertheless, the Association of Cashew Processors Ghana (ACPG) implemented a five-year strategic plan to revamp cashew processing businesses in Ghana to fully exploit the socio-economic potential of the crop. The Association intends to increase processing volumes of Ghanaian raw cashew nuts from 12,000 metric tons to 80,000 metric tons by 2023. The plan also seeks to maximize the use of installed processing capacities from ten percent to seventy-five per cent. This will lead to the creation of more than 10,000

direct and indirect jobs in the cashew sector, with an overall wage of GH¢30 million yearly, especially for women in rural areas.

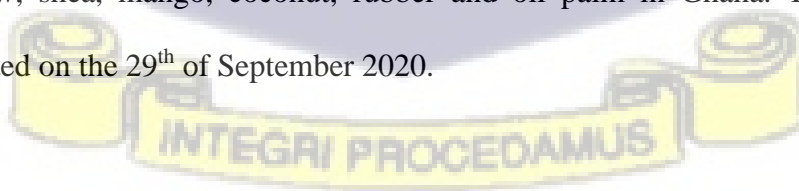
As such, USIBRAS Ghana Limited, a Brazilian owned Cashew processing company handed over eighteen high-capacity shelling machines to the association. which are to be distributed to six out of the twelve local cashew factories that are currently not operational due to lack of equipment. The equipment has the capacity to process 200kg (kilogram) of nuts per hour compared to the manual processing methods used by the local cashew processors (Benjamin, 2018).

❖ **Distributors**

These include buyers, aggregators or intermediaries, retailers and exporters of raw cashew nuts in Ghana. Some companies buy directly from farmers by travelling from one community to another while others buy from retailers or aggregators. Traders are responsible for transporting cashews to ports and pay for the related costs. These RCN are then sold to exporters directly and sometimes, to secondary intermediaries or aggregators. Some cashew companies include: Olam Ghana, Alphonsah cashew industries, and Sadat Cashew and All Nuts Company Limited.

❖ **Tree crop development authority (TCDA)**

These stakeholders are responsible for overseeing issues and coordinating tree crops such as cashew, shea, mango, coconut, rubber and oil palm in Ghana. The authority was inaugurated on the 29th of September 2020.



❖ **Ministry of food and agriculture (MOFA)**

The ministry is the focal point and umbrella of the government of Ghana and responsible for coordinating matters, developing plans and strategies of all aspects of Ghana's agriculture sector.

❖ **Exporters**

There are few exporters of cashew in the country mostly from the Ahafo Region, as the harvested RCN are collected in bulk and packed into labelled sacks which are then transported to Tema harbour, where they are shipped to target markets such as India and Vietnam. Exporters of RCN include: Ghana Export Promotion Authority (GEPA), Gyarko Farms Ghana. Other governmental bodies that oversee issues related to cashews are: Tree Crop Development Authority (TCDA), Cashew Council Ghana (CCG) and so on

❖ **Consumers**

Roasted cashew sold at supermarkets and other retail shops are purchased locally by lovers of cashew nuts.

2.6 Contributions or Benefits of Cashew To Ghana's Economy

The first ever recorded exports of cashew nuts from Ghana was in 1991, amounting to 15 metric tons, and rose to 3,571 metric tons in 1997 (Ministry of Food and Agriculture, 2007 cited in ADF,2000). Mr. Kennedy Osei Nyarko, the Deputy Minister in charge of Perennial Crops, Ministry of Food and Agriculture, stated in his speech in Aburi at the first session of the sixth edition of a five-day Master Training Program for experts along the value chain to promote the competitiveness of African cashew in the Eastern Region that, Ghana's cashew sector is currently the leading agricultural non-traditional export, with a total amount of \$197 million worth of export

revenue in 2016, representing 53 per cent of the total non-traditional export revenue of \$371 million. The sector, with an estimated production area of about 89,000 hectares, had created about 40,000 and 1,800 direct and indirect jobs in production and processing respectively. This would contribute to the district level industrialization drive, as well as diversify exports for more revenue.

In addition, an amount of US\$23 million PRO-Cashew project was launched on the 2nd of December 2020 in Abidjan to boost cashew production in Ghana and four other West African countries. According to a statement by the President of the African Cashew Alliance, Babatola Faseru, emphasis should be made on the importance of cashew. Babatola Faseru urged African leaders to show more commitment and interest towards developing the cashew sector on the continent to support in poverty reduction.

Cashew is a multipurpose plant because it can be used for medicinal purposes, animal feed, biomass and so on. The cashew plant can be categorized into three kinds namely: raw cashew nuts, the cashew kernels and the cashew apple. The cashew apple can be used by fruit factories to produce juice, the kernel is regarded as the valuable part of the plant and the nut is derived from the kernel which is further processed for export and local market consumption. The kernel also produces what is called cashew nut shell liquid (CNSL) which is also a major source of cardanol, a phenolic liquid which is an important resource in chemical industries, additives industries and fuel industries used to produce low Sulphur diesel fuel (Panda, 2013).

The impact of cashew production is evident in:

- ❖ **Poverty reduction:** The contribution of cashew has been massive among farmers across production areas in the country. With the applaudable government initiatives such as, Planting for Export and Rural Development, Free distribution of cashew seedlings,

GEPA's yearly mass spraying of cashew plants. A lot of farmers have engaged in its cultivation and hence serve as a source of living for them.

- ❖ Source of employment especially for women: every year cashew seedlings are nursed for distribution in various districts which is usually done by women. Also, the picking of cashew nuts during harvest is carried out by women.
- ❖ Discourage rural-urban migration: In the past people, especially the youth migrated to the south in search for greener pastures. Taking Jirapa for instance, in time past, most of the indigenous traveled long miles during farm seasons to other neighboring towns that had fertile lands for cultivation. This was so until government and other non-governmental organizations paid more attention to the district and discouraged people from traveling to other places to farm.
- ❖ The advocacy for establishment of enough cashew processing factories in the country to add value and combat unforeseen circumstances such as Coronavirus. Since the advent of the virus, cashew farmers have complained and agitated for more processing industries to ensure that Ghana processes her own cashew instead of relying heavily on export of raw cashew nuts.

Finally, on the contributions, the Sustainable Nut Initiative (SNI) was formed as part of the motives to harness the cashew industry. It concentrates its efforts on enhancing accurate transparency and concentrates its efforts on enhancing accurate transparency with the objective of achieving security of supply, attain quality and work towards sustainability and excellence (innovation and technologies in the cashew sector, 2019). Another function of the initiative is to evaluate and analyze the entire nature of the cashew crop and explore fast emerging technologies that could be adopted to enhance and spearhead the

performance of the cashew sub-sector not only in Ghana but in Africa and the world at large. It is also working towards adopting technologies such as drone services which could be used to check and monitor animal grazing, irrigation and bushfires, a menace that is prevalent in cashew plantations especially in the Savannah regions.



CHAPTER THREE

LITERATURE REVIEW

3.0 Introduction

This chapter examines existing literature of relevant theories that form the foundation of cashew supply chain, and how it can be implemented to improve cashew sub-sector. The empirical study also looks at literature surrounding the production of cashew and its supply chain in order to learn lessons from best practices to enhance Ghana's cashew sub-sector. Also present in this chapter is the conceptual framework of flow regarding the cashew supply chain.

3.1 Theoretical Framework of The Study

To ensure efficiency of cashew supply chain, that is, from production to the final destination, cashew farmers, together with processors, and other actors along the supply chain, may develop effective and adequate organizational supply chain practices. This is to harness supply chain sustainability, as well as ensure smooth supply of products to appropriate consumer markets. Hence, to achieve a reliable, responsive and sustainable cashew supply chain, activities and processes may be functional along the triple bottom line (TBL).

This theory was adopted by Silva et al., (2018) which assessed the state of cashew nut supply chain in Brazil as well as best practices on how the supply chain can withstand certain inefficiencies in order to achieve a robust and transparent supply chain. Further, Azevedo et al., (2018) in their study indicated that the cashew supply chain is making efforts to undertake sustainable practices through the introduction of the Triple Bottom Line (TBL) actions.

The concept of triple bottom line (TBL) was propounded by John Elkington in 1997 with an underlying assumption of ensuring firm level sustainability. The concept of triple bottom line is for businesses, organizations or companies to think beyond and appreciate that there is more to business activity, rather than the usual way of running its activities which in most cases is to earn profits, even though profit making is also important.

TBL is a way of assessing business performance based on three crucial areas, also known as (3ps), namely: people, planet and profit. The 3ps formulation was developed in 1995, and later adopted by shell for its first shell report and currently used widely in the Netherlands (Elkington, 2001). The developer of the theory John Elkington, encourages businesses to think more broadly and deeply with regards to how their activities have impacts on the society, and more importantly implementing sustainable business models.

It is assumed that businesses exist solely to maximize profit which is a traditional way of measuring the success of any business. However, there are a number of business measures that are linked to profit. These include: the share price or value of a business (closely linked to the achievement of profit), management of employee, incentives and bonuses (depend on the profit of businesses). Hence profit maximization plays an integral role in businesses, but should not be considered as the only factor in a business.

The concept of the triple bottom line (TBL) is that, there exist more than just one bottom line. It aims to measure not only financial, but also the social and environmental aspect of businesses over time. Hence the 3ps “People” “planet” and “profit”. People, has to do with values and the extent to which a particular business is responsible, by granting appropriate training to their employees and imbining in them values to ensure sustainable business that aim not only on making profit. Planet, measures the impact of business on the environment be it tangible or intangible. Businesses

are advised to take the sustainability of the environment as priority regardless of their operations. For instance, preparation of land for farming in Ghana is mostly carried out the traditional way. That is, burning the fields, cutting trees, ploughing, application of various chemicals and so on. These actions tend to eventually destroy the land and cause it to lose its nutrients subsequently. That is why the ministry of food and agriculture (MOFA) initiated the savannah zone agricultural productivity improvement project (SAPIP) since 2017 particularly to enforce conservative agriculture by way of sustaining the environment. The last of the 3ps is profit which is what businesses achieve from successful operations over a period of time, usually reported in their income statements.

This theory is considered for the study because, even though we are seeking to achieve a robust supply chain, it should not be geared towards only maximizing profit but considering other factors such as, environmental and human resource. This is particularly important because of the area of focus, which is agriculture.

3.2 Empirical Framework of The Study

3.2.1 Cashew Production in Ghana

Cashew is a native of Brazil and cultivated in most tropical and sub-tropical countries like: Benin Republic, Brazil, Cote d' Ivoire, Guinea Bissau, Ghana, India, Mozambique, Nigeria, Philippines, Sri Lanka, Tanzania and Vietnam. It is a multipurpose tree crop with high economic potentials (Adeigbe et al., 2015). The author also stipulates that cashew is a drought resistant crop. But that assertion is not entirely the case, because in Ghana cashew farmers in the Upper West Region are unable to make good yield as a result of challenges including irrigation. Dry season or harmattan in the region is evasive and that affects growth and maturity of the plants. Moreover, Olubude et

al., (2017) confirms that irrigation ensures maximum productivity, increasing the harvest period and improving the quality of cashew. Farmers have since advocated for effective irrigational systems in order to ensure progress in plant development.

This can also be curbed by undertaking conservative agriculture (Rupa et al., 2013). The scientific name for cashew is known as *Anacardium Occidental* L. (Hammed, 2008). Cashew is a tree crop that is cultivated generally to control desertification and soil erosion. Full value of cashew is obtained at the processing and packaging stage but in Ghana, Farmers are unable to derive maximum value due to limited number of processing firms in the country and training of appropriate packaging skills (Christian-Ann, 2015). As confirmed by (Gesellschaft & Giz, 2012), cashew nuts after harvesting, should be packed in jute bags and sealed properly. Boxes, fertilizer sacks, polythene, buckets amongst others should be avoided completely in order to maintain quality of the nuts.

Cashew products are categorized mainly into three which include: the raw cashew nuts, cashew kernels and cashew nut shell liquid (CNSL). These main products are traded on the international market. Nevertheless, a fourth product is the cashew apple which is usually processed and consumed locally (Azam-Ali & Judge, 2001). In Ghana, majority of cashews that are exported is the raw cashew nut (RCN). Results from a study have it that Ghana exports over 98% of raw cashew nut (RCN) and the remaining 2% are processed locally (Ashitey, 2012). Also, cashew apples are usually wasted due to lack of adequate fruit processing factories in the country. Adeigbe et al., (2015), in a similar study, purported that cashew is grown economically for its nut, apple and wood produced from its branches. Products derived from the nuts include the world's highly delighted roasted kernel snacks, kernel oil, cashew nut shell liquid. From the apple also comes: juice, jam and alcohol among others. However, due to lack of expertise and inadequate

technological equipment, Ghana is unable to fully tap into the potential of the cashew tree. Hence majority of cashews that are produced and exported from Ghana are raw cashew nuts (RCN) (John et al., 2018). In addition, outcome from a survey conducted showed that cashew trees in Ghana are commonly affected by a range of insects and pest. The study indicated that there are about 170 insect species that attack the cashew trees in Ghana (Dwomoh et al., 2008). A study conducted in Tanzania amongst some cashew nut Farmers revealed that there was a 92.7 percent increase in pest and disease on their cashew plants and that had seriously reduced production (Malekela et al., 2021). Some of the diseases mentioned included, powdery mildew, blight disease, dieback and Anthracnose. There are regions in Ghana identified as suitable areas for cashew cultivation but the Brong Ahafo, Bono east and Ahafo regions are regarded the hub of Ghana's cashew due to inadequate resources to improve production from the other regions. Cashew is a perennial crop and comes in different types and sizes. For instance, The newly Brazilian Jumbo sized nut cashew plants starts bearing its fruits between 18 to 24 months and attains its full production by the ninth to Tenth year (Hammed, 2008). Well-developed cashew trees in Ghana normally begin flowering in late November to December with the fruit maturing between 90 to 100 days after flowering. The ripe cashew fruit normally start to drop naturally in late January.

However, fruit harvest and collection period is between February and March, whereas late maturing trees drop their fruits in April (Gesellschaft & Giz, 2012). Notwithstanding the economic potential of cashew, the method of production, harvest, collection and storage practices affect the quality of cashew nuts. Unfavorable living conditions of farmers usually compel them to harvest the cashew at a rather pre-mature stage. This practice usually leads to about 40% post-harvest losses of cashew nuts because the immature nuts have high moisture content hence not suitable for export. Inadequate drying and improper storage, are all factors contributing to poor quality of

cashew (Adeigbe et al., 2015). A research conducted by Gyedu-Akoto (2014), also proved that 76.1% of farmers in Ghana had no appropriate storage facilities and this affects the quality of nuts. This situation leads farmers to selling their nuts immediately to available markets.

After harvest, cashew farmers usually supply the produce to rural markets, where small traders buy and supply to middlemen or aggregators in various urban markets. These agents then supply to other big companies and export to other countries (Hammed, 2008). The process is not entirely different in the case of farmers in Ghana but without limitations. Another study confirmed that farmers earn more on marketing channel without intermediaries and the export companies also buy at a lower cost (Mensah et al., 2019). Hence the best way is to deal with farmers directly.

3.2.2 Supply chain and some initiatives taken by various stakeholders in response to the supply chain of cashew

Supply chain can be defined as the movement of goods and services from the source to the final destination. The supply chain is made up of a number of actors such as manufacturers, suppliers, transporters, warehouses, wholesalers, retailers, and other intermediaries including the customer. Every product available on the market for sale goes through series of processes from its raw state to its finished product (Felea & Albăstroiu, 2013).

Supply chain processes cannot exist independently without taking cautious efforts to ensure management practices and success. Joel et al., (2012) defined supply chain management as the integration of trading partners' key business processes from the source, thus raw material extraction to the final or end customer, including all intermediate processing, transportation and storage activities and ends with the sale of finished product to the customer.

Vorst (2004) also explained that supply chain management is the integrated planning, co-ordination and control of business processes as well as activities in the supply chain to ensure efficient delivery to consumers along the supply chain whilst satisfying requirements of other stakeholders in the supply chain. Most organizations and companies usually look at supply chain in different perspectives. Some look at it from sustainability, green supply chain, or responsiveness point of view; all of which are geared towards enhancing their supply chain. It is crucial to identify various actors and their key responsibilities in the supply chain, and make sure each is channeled accordingly to improve overall performance.

Vorst (2004) identified three key decisions to consider in the supply chain and they are: identifying key supply chain actors, what processes or activities to link to each member and what level of integration and management should be applied to each process in the supply chain. More also, to understand supply chain processes and activities, Bozarth & Handfield (2013) came up with the supply chain operation reference (SCOR) model. The model is a framework, which was developed and endorsed by the Supply Chain Council, to provide standard descriptions of the processes, relationships, and metrics that define supply chain management. The model encompasses five broad areas which are as follows:

1. Planning activities: thus, balancing demand requirements against resources and communicate these plans to the intended participants
2. Sourcing activities: include identifying, developing, and contracting with suppliers as well as scheduling the delivery of incoming goods and services.
3. Actual production of a good or service
4. Delivery processes: include everything from entering customer orders and determining delivery dates, storage and transferring goods to their final destination or pick up point

5. Return stage: this involves consignments needed to be returned either, defective or excess products or material.

Supply chain has been one of the core concerns of various manufacturing organizations and Ghana's cashew sector is not an exception. Supply chain linkages is one of the primary issues of concern for Ghanaian farmers mostly because Ghanaian cashew sector lacks a well-designed structure and organization (Heinrich, 2012). Taking the Upper West region for instance, most farmers are disorganized and are not under associations or groups. This makes it difficult for the farmers to access appropriate markets and obtain good value for their produce. Rather, they sell to individual village farmers making it impossible to sell in bulk which is more profitable.

There have been some attempts to address these supply chain complexities. With the introduction of information communication technologies (ICT), the African Cashew Initiative adopted it in the cashew sector by liaising with some software companies to develop a technology for digital record keeping, logistical coordination and tracing of cashews sold by a farmer association consisting of about 400 members in Wenchi, Bono East region (Heinrich, 2012). This was to increase transparency and improve efficiency in the supply chain. Software solutions allow farmers to receive market information and advice on agricultural practices through short message services (SMS). But in recent times, farmers have expressed dissatisfaction on the performance of cashew supply chain which was confirmed by Sylvia (2020) that, farmers needed a more reliable, efficient, and responsive supply chain especially during the coronavirus pandemic. It can therefore be argued that, the introduction of these technologies did not make a great impact on the farmers. Besides, there are more than one cashew growing areas in Ghana that could have also benefited from the program.

In addition, FairMatch Support, on March 2016 inaugurated their regional office in Bobo Dioulasso, Burkina Faso, to improve its service in West Africa. They believe in proximity and decentralization of organizational processes or activities. Their main objective for West Africa is to establish linkages between producers and processors as well as the development of local markets. Hence they have implemented a 3S software system (Standard, Sharing, Software) to ensure market linkages along the supply chain (Christian-Ann, 2015). This initiative has chocked success in countries like, Burkina Faso, Cote d' Ivoire and Benin. Cashew farmers in Cote Ivoire now receive regular market and price information by mobile phone. Software applications and radio broadcast have been the means through which farmers are informed on recent price developments (Christian-Ann, 2015).

In the case of Ghana, this has not been impactful due to feedback from farmers regarding complexities of the supply chain. The Nigerian cassava industry, in collaboration with the sustainable trade initiative (SNI), developed a farm mode known as block farm model to sustain their supply chain activities, considering how important the crop is to the growth of their economy. The block model is used to manage supply chains efficiently. It is operated by establishing links between processing companies and small holder farmers in a mutual beneficial way, while offering technical, educational and financial support to ensure effective production. This can also be adopted in Ghana's cashew sector to enhance the supply chain. A similar model is currently being used by the savannah zone agricultural productivity improvement project (SAPIP) under the ministry of food and agriculture (MOFA) to ensure commercial production of maize and soya bean from the Savannah regions. This move has improved production of maize and soya bean from the regions and contributed to sustainable livelihood.

3.2.3 Opportunities of cashew in Ghana

Cashew has the potential to overtake cocoa in the international market (John et al., 2018). But due to absence of suitable technological equipment, adequate resources, and so on, Ghana is unable to derive full value from the cashew plant. However, with the purchase and donation of sophisticated processing machines to the Association of cashew processors in Ghana by USIBRAS limited, a Brazilian cashew company in Ghana, Ghana will be able to tap into the full potential of the crop (Benjamin, 2018).

There is a growing demand on the world market for cashew kernels as well as its by-products. It is ranked third in the world of nuts after almond and walnut with a world demand of about 1.75 million metric tons (Ghana Cashew Association, Brong Ahafo chapter, 2008 cited in PK Sarpong, 2011). According to the Ghana Export Promotion Authority, Ghana's export destination for cashew is Vietnam and India.

There are prospects to increase cashew production and processing for both local consumption and export even though Ghana is a late developer of the cashew crop. For instance, production of raw cashew nuts increased from 6,338 tons in 2003 to 34,633.88 tons in 2006; 23,616.40 tons in 2007 and 81,190.47 tons in 2008 (ISSER, 2002, 2006, 2007, 2008). In 2006, Ghana exported 47,000 metric tons of raw nuts. This earned the country about US\$ 23 million. This figure is considered small when compared with world excess demand of 430,000 metric tons of raw nuts, valued at US\$270 million, and growing at a rate of five to eight per cent per annum (Ghana Shippers Council, 2007 cited in CDP,2008).

With appropriate allocation of resources in various cashew growing regions, Ghana will be able to close the gap in the international market. John et al. (2018) in their study added that, cashew will contribute to poverty reduction especially among rural farmers. But Boafo et al. (2019) argues in

their paper that, since cashew is a seasonal crop it has not the potential to make a great impact in poverty reduction, because farmers only get to sell their nuts between February and April hence the need for them to engage in other economic activities that will earn them some income to sustain them for the period.

Cashew farmers in the Bono East and Ahafo regions disclosed that they became aware of the high potential of cashew through the Asian companies that existed in the region. According to them, these Asians, during the harvest seasons purchase large quantities of raw cashew nuts influencing most farmers to go into cashew cultivation. Findings from a paper by Boafo et al. (2019) testify that, in Amponsahkrom in the Bono East region, a farmer stated, there is ready market for cashew nuts (Interview, 02/09/2016). He added that during the harvest period, there are influx of buyers rushing for the nuts. Another farmer in Kintampo confirmed availability of market for cashew nuts (Interview, 16/09/2016). These feedbacks were confirmed in the International Trade Centre (2015) report which indicated that the interest of African cashew farmers depended on the availability of ready markets.

Cote d' Ivoire is regarded the largest exporter of RCN (Koné, 2010). But high tax placed on the export of RCN deters most of these Asian buyers to purchase from the country. Rather, they prefer to buy from Ghana because of the absence of such tax in the Ghanaian export market (Koné, 2010). This has exposed most farmers especially in the Brong Ahafo region to high demand of cashew nuts in the global market, which has encouraged specialization of cashew production in the region. But Robinson et al. (2012) claim that, specialization of cashew by various farmers has not really provided the desired economic transformation thus, in the area of job creation, poverty reduction and ensuring good living standard particularly amongst rural farmers in the country.

Apart from social and economic benefits, cashew has some industrial benefits. Panda (2013) pointed out that chemicals such as cardanol is derived from the cashew plant. Cardanol is a phenolic liquid and has myriad of uses and applications in some chemical, additives and fuel industries for low Sulphur diesel fuel. But Aracelli et al. (2016) emphasized that regardless these benefits, substances required to produce a final product to make its use harmless and medically approved without any complications is yet to be found out.

3.2.4 Challenges of cashew farming

The first challenge is lack of farmer knowledge on farm gate prices. Most farmers in the communities are oblivious of the market prices for the crop hence sell at the aggregator or middleman's price because they have to cater for domestic needs. The aggregator's or middleman's price is relatively lower compared to the market price. This puts the farmer in debt, hence the inability to produce next season or expand the cashew farm. The issue of low prices and the resultant low incomes for cashew farmers in the region deter farmers from working on their farms. And because most of these farmers resort to loan facilities to maintain their farms, they are unable to meet their debt timeline. This set back has the potential to cripple the sector and increase the incidence of unemployment and poverty. Bofo et al. (2019) discovered in their findings through interviews from some cashew farmers in Wenchi that the process of determining price of farm produce in Ghana is unknown and understood as reducing profit margins accrued by farmers. They added that even though they were uncertain on farm gate prices, whenever the buyers came around, they purchase the cashew nuts at high prices. According to the farmers, they had never received farm gate prices as high as those of cashew. But this manner of selling to private companies or individuals because they buy at high prices is not sustainable.

Instead of selling to companies who are willing to work with farmers by supporting them with required agricultural inputs, offering advice on good farm practices and conducting training for the farmers is more strategic and sustainable. An example of a cashew company which has some nucleus cashew farmers and offering them support in the country is Olam. Olam is the leading exporter of raw cashew nuts (RCN) in Ghana. Farmers in this regard should be willing to work with companies or governmental agencies who intend to establish sustainable business relationship, in which they will guarantee a market while providing them with agricultural advice and services (Heinrich, 2012).

Furthermore, Abdul-Saeed, the Upper West regional President of Cashew Industry Association of Ghana (CIAG), disclosed some setbacks that farmers in the Upper West region faced. He spoke about deplorable road network from farm to destination and lack of appropriate storage facilities (interview, 15/01/2021). He also added that inadequate pricing was of great concern to farmers in the area which fortunately was also of pertinent concern to cashew farmers in general. (Michael, 2020), Cashew farmers expressed worry over price of cashew because buyers usually propose their prices whereas farmers also have various prices they intend selling hence this usually causes a banter between cashew farmers and the buyers.

Unlike cocoa which has COCOABOD as a regulatory body setting price ceiling for farmers, cashew does not have that. Though the Tree crop development Authority was set up by government to serve as a regulatory body for tree crops such as mango, shea, and cashew and so on, the Authority was not fully operational at the time of this study. In addition, Ghana has vast land to undertake any agricultural or economic activity (ADF, 2000). But land acquisition in Ghana is a tussle especially with females who decide to go into farming. Kuusaana et al. (2015) in their

findings stated that land acquisition in the Upper West region of Ghana is based on customary tenure system led by both well-structured social and cultural rules which often result in equal land access by families and clans. This situation predominantly affects women who want to access land for farming because they have to go through series of approvals before using any land, which in most cases, is not successful.

In the typical Ghanaian setting, land ownership is usually attributed to the first settler and are normally families, clans, and royals, a situation that has existed since the onset of civilization (Donnelly, 2012). This cumbersome manner of land ownership in Ghana poses a great threat to cashew farmers who have to acquire lands through either grant or purchase from customary landowners. Again, Uwagboe et al. (2010) reiterated on the issue of lack of storage and lack of access to capital encountered by cashew farmers. Cashew farming is naturally labor intensive especially during harvesting and processing. Lack of capital could lead to low productivity and unavailable storage could lead to low quality nuts and harvested cashew vulnerable to theft and bushfire.

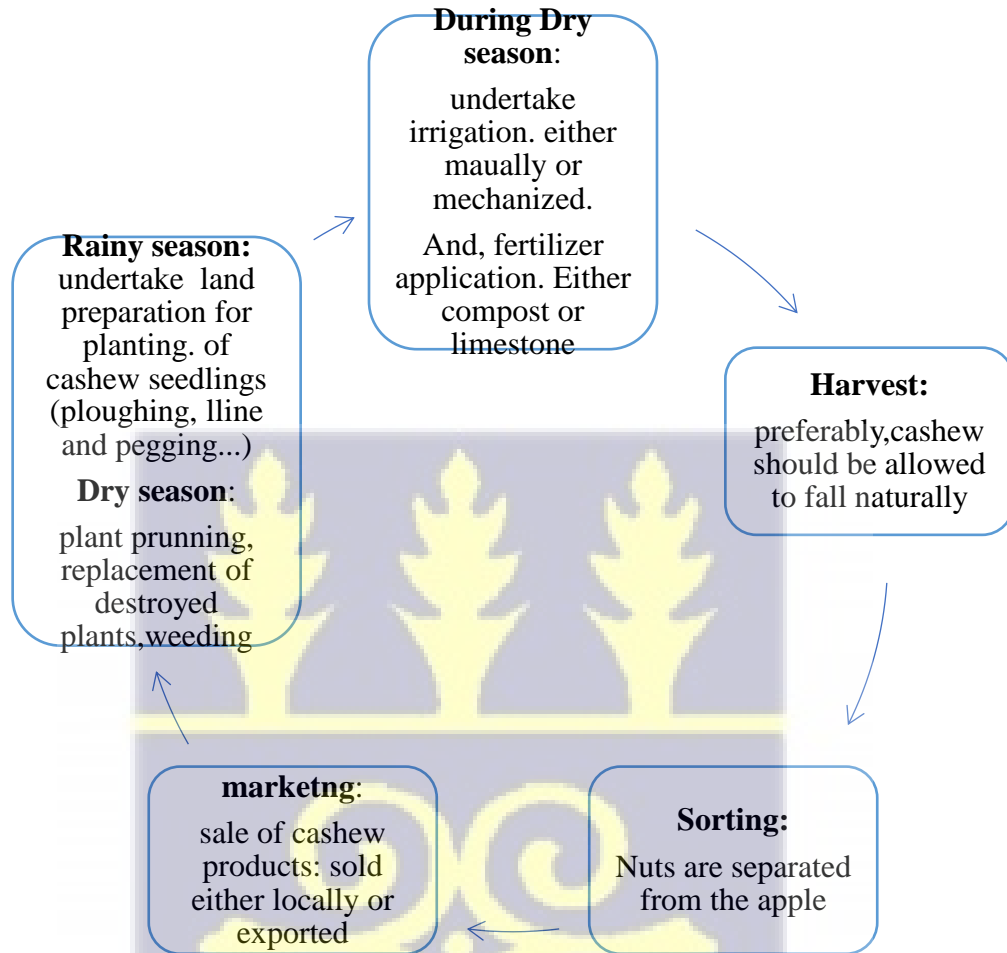
Further, with emerging technologies enhancing agriculture in most countries like India and Vietnam. In Ghana, majority of farmers and cashew farmers still rely on the traditional method of farming, leading to inefficiency. Nhantumbo et al. (2017) in their research paper to find out the intensity of farmers adoption to new technology, discovered that many farmers had no access to agricultural extension services which was a major limitation. But Ojolo, Olatunji, & Orisaleye, (2015) pointed out that even though technology has been identified to have a positive impact on agriculture, farmers are still reluctant to adopt it. Hence, they suggested the use of ergonomics, an interaction between humans and machines. According to them, knowledge of ergonomics will

enable designers create suitable technological devices that will ensure easy adoption. Some organizations such as African cashew initiative in collaboration with Techno Serve have taken steps to equip farmers with technological expertise, technical services to improve overall performance of cashew supply chain. To achieve an effective supply chain, the issues right from production to distribution of the product must be properly addressed, and the implementation of some technologies is another way shortening the supply chain (Sylvia, 2020).



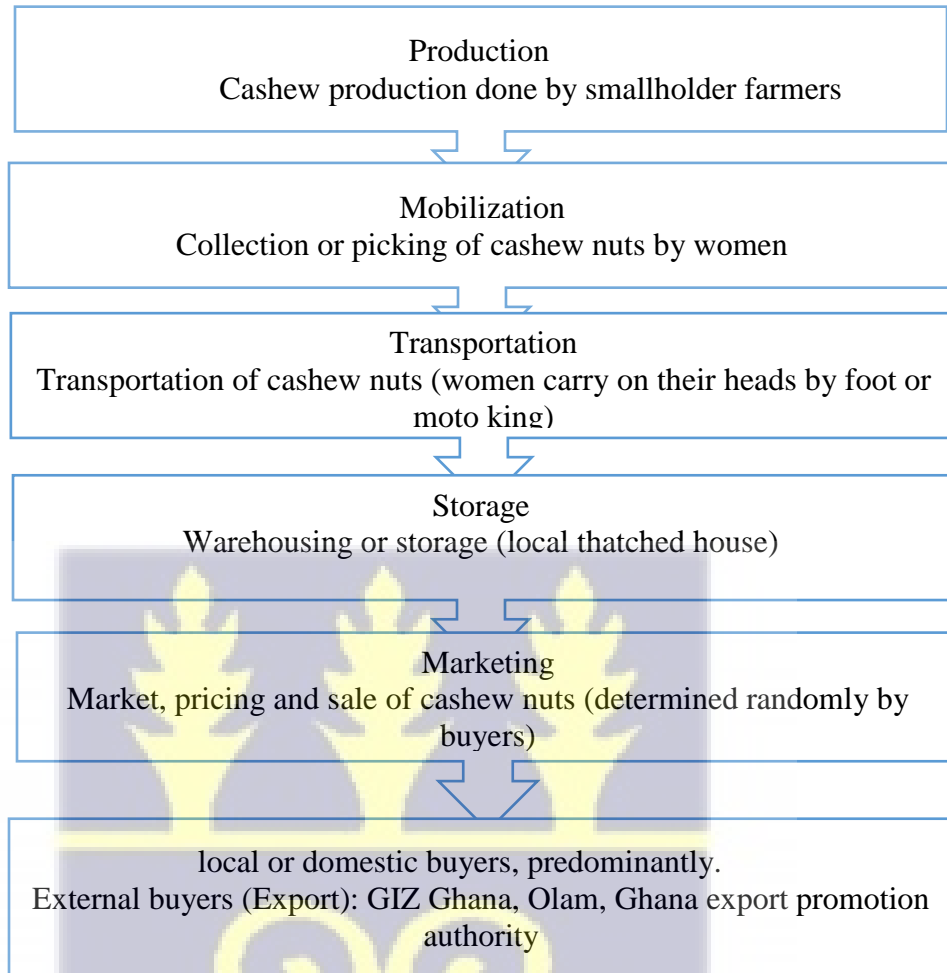
3.3 Conceptual Framework

Figure 3.1 Flowchart of the process involved in cashew production,



Source: Azevedo et al. (2018).

Figure 3.2. Current Cashew supply chain in the Upper West region of Ghana.



Source: Author's construction, 2021



CHAPTER FOUR

METHODOLOGY

4.0 Introduction

The study sort to examine the supply chain of cashew by understanding the processes involved in its production and marketing as well as challenges confronting the cashew sector in the Upper West region of Ghana. Subsequent sections of this chapter look at the research design, description of study population and area, sample size determination, sampling technique and data collection methods and instruments and data collection procedure.

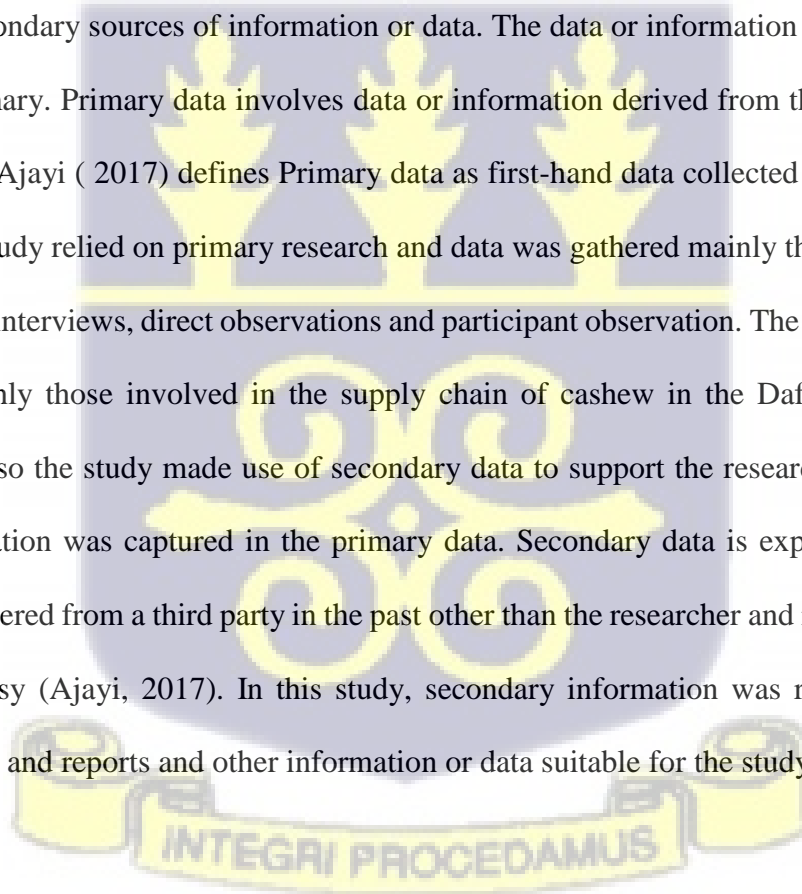
4.1 Research Design

The purpose of this research is to examine the cashew supply chain. To achieve this research purpose the study employed a qualitative research approach. Boateng (2018) explains that qualitative research is one that explores values, attitudes, meanings, and beliefs in which people associate with a particular situation in order to establish good understanding, rather than to test, either to agree or disagree a relationship. This research approach was deemed appropriate because it enabled the researcher collect information from stakeholders involved in the cashew supply chain in order to facilitate accurate understanding of the subject. It also helped the researcher capture feelings and experiences of participants that were necessary for the study. Brazen (2014) enumerated and discussed four types of qualitative research namely: phenomenology, ethnography, grounded theory and case study. But for the purposes of this study, a case study was used. Boateng (2018) describes case study as a specific unit where the research is undertaken and the unit is referred to as a bounded system. The researcher used the Upper West region as a case

study and it is because, just like the Bono East and Ahafo regions, the Upper West region is making progress in the production of cashew but faced with some supply chain complexities which have been explained in detail in the problem statement of this thesis. In that regard, the researcher wanted to pay full attention to the area of study in order to improve quality and efficiency of the research.

4.2 Sources of Data

The center of every research is the relevant data or information used to back whatever the study seeks to achieve. Muhammad & Kabir (2018), categorizes sources of data into two, namely primary and secondary sources of information or data. The data or information used for the study was mostly primary. Primary data involves data or information derived from the source and it is more objective. Ajayi (2017) defines Primary data as first-hand data collected by the researcher. However, this study relied on primary research and data was gathered mainly through conducting semi-structured interviews, direct observations and participant observation. The participants of the study were mainly those involved in the supply chain of cashew in the Daffiama-Bussie-Issa district. More also the study made use of secondary data to support the research because not all relevant information was captured in the primary data. Secondary data is explained as data or information gathered from a third party in the past other than the researcher and it is also described as quick and easy (Ajayi, 2017). In this study, secondary information was retrieved from the various websites and reports and other information or data suitable for the study.



4.3 Study population

There are about forty-six districts in the Upper West region (Aniah & Kpentey, 2014). Out of these districts, Daffiama-Bussie-Issa district has the most active cashew farmers. This was explained in detail in the scope of this study. According to Mark (2020), the district has the most cashew farmers under the Planting for Export and Rural Development (PERD) program. This informed the researcher's intention to carry out the study in the Daffiama-Bussie-Issa district of the Upper West region. The section of the population in the cashew supply chain suitable to participate in the research comprised of: farmers, middle-men or aggregators and some cashew exporting companies. This made it possible for the researcher to explore supply chain activities these stakeholders mentioned above go through by giving detailed narratives of their cashew production experiences with regards to production, marketing and challenges involved at various levels of cashew cultivation. According to the local assembly there are thirty-four communities in the Daffiama-Bussie-Issa district. The cashew schedule officer from the district Agricultural office added that out of this number, fifteen of the communities are actively involved in cashew production. He further described it as hotspot areas for some exporting companies and middlemen who buy the produce. But for the purpose of this study, five of the communities who had majority cashew farmers were used. These are Issa, Owlo, Tabiesi, Wogu and Fian. These five communities give a total of 190 male farmers and 141 female farmers.



Table. 4.1 Below is a table that contains these active cashew growing communities together with the number of farmers by gender.

Name of community	Number of male cashew Farmers	Number of female cashew Farmers
Issa	31	41
Dachie	15	8
Owlo	30	60
Samambo	18	20
Sazier	21	10
Jenpensi	15	3
Kojokperi	20	0
Moyiri	22	6
Daffiama	28	7
Bussie	24	5
Bunyiri	25	3
Tabiesi	56	11
Wogu	36	7
Fian	37	22
Pubaa	9	3

Source, (Interview: District Agric Office-Issa, 2021)

In the case of middlemen or aggregators, it was difficult to determine the exact number in the study area because these middlemen only come around during the cashew harvest season between February and April to buy cashew nuts. However, you could find at least two middle men or aggregators in each community buying the cashew nuts. Some cashew exporting companies in Ghana include; Gyarko Company limited, Giz, Olam Company limited and Jorom Company limited amongst others. But for this study, Olam and Jorom commodities limited were selected as part of the study population. This is because, these two companies are highly recognized by farmers in the Daffiama-Bussie-Issa district than the other companies. Besides, for the exporters, GEPA is the governing body that facilitates the process of exports of cashew nuts for various cashew exporting companies in the country. From an interview with the Director of international export division GEPA, he recommended Jorom Commodities Company limited, where the researcher could get an in-depth information regarding their cashew supply chain. Olam Company limited is also the largest private and recognized exporter of cashew in the country. It is hoped that using these two exporters will contribute massively to the richness of this study.

4.4 Sample Size

It is imperative for every research to decide on an appropriate sample size to conduct the study since it is impossible to exhaust an entire population especially when the researcher is bounded by time. Boateng (2018) assert that in a qualitative research, it is best to use a small sample size of 10 to 20 to ensure quality and credibility of the problem being studied. This was applied in selecting a sample size of 10 farmers from each of the five communities selected giving a total of 50 farmers. Thus 25 male farmers and 25 female farmers to ensure balance. Further, the sample size for cashew farmers was determined based on information of the number of cashew farmers in each of the

active cashew communities listed in the table above. Hence, selecting communities with majority number of cashew farmers, both male and female to be part of the sample was a good representation to reflect all cashew farmers in the Daffiama-Bussie-Issa district. In the case of the middlemen or Aggregators, the researcher interviewed a total of 10, thus, 2 from each of the selected communities. In addition, each of the exporting companies, Olam and Jorom commodities, gave the researcher slot to interview 1 official giving a total of 2. For Olam, the Head of exports and operations was interviewed and for Jorom commodities, it was the Director of Nursery and export division. This information as well as what could be done with the available resources influenced the decision on the sample size. Hence, an overall number of 62 participants were involved in the study.

Howbeit, Boateng (2018), pointed out the difficulty involved in determining a sample size as a limitation of a qualitative research. He therefore advised, that participants should represent a dimension of potential participants in order to achieve differences in perspectives.

4.5 Sampling Technique

In qualitative research, Scott & Johnston (2009) described in detail the various types of sampling techniques researcher's adopt. Some of these techniques include: convenience sampling, stratified, purposeful, opportunistic sampling technique and the likes. But for the purpose of this study, two sampling techniques were employed. Purposive sampling; which is a non-probability sampling technique and snowball sample techniques were used. Boateng (2018) defines purposive sampling as the researcher's ability to identify and select an appropriate sample out of a population to foster quality and reliability of the research. Convenience sampling on the other hand is a technique that enables researchers select at random participants who are available and whose contributions could

be of help to the study while snowball sampling technique allows a participant lead the researcher to another participant whose inputs are relevant to the study. Boateng (2018) also described it as a multistage sampling technique. Even though most communities in the Daffiama-Bussie-Issa district are into the production of cashew, not all of them are actively into its production as confirmed in the study population of this chapter. Jorom commodities and Olam were selected using purposive sampling technique since they are the exporters of cashew nuts in the country.

Purposive sampling also provided the researcher an opportunity to gather experiences of study participants on the processes involved in the production and marketing of cashews as well as challenges and the way forward to improve the supply chain of cashew in the upper west region and Ghana as a whole.

Convenience sampling on the other hand, made it possible for the researcher to interview two middle man from each of the five selected communities. With snowball sampling technique, the researcher had a contact list of serious male cashew farmers in each of the five communities selected. This enabled the researcher hold an initial interview with them, after which they introduced the researcher to other participants. In addition, communities in the Daffiama-Bussie-Issa district are relatively small in terms of population. “Everybody knows somebody”, hence the farmers know each other including middlemen who buy the nuts. The snowball method was easier for the researcher to identify individuals pertinent to the study till the sample was reached.

4.6 Data Collection Instruments

Available literature reveals a myriad of qualitative data collection instruments that researchers employ to spearhead their data collection processes. Hence the researcher must endeavor to make

sure that the method or methods selected is appropriate and consistent with the objectives the study sort to achieve (James, 2014).

There are various forms of qualitative data collections and some include: interviews, observations, documents, archival records, focus group discussions and the likes. For this study, the researcher employed interviews; semi-structured interviews, and observations; direct and participant observation as the main data collection instruments. This technique was used because most people in the study area cannot read and write. With participant observation, the researcher made use of electronic gadgets such as audio recordings and videotapes to help check bias and selective observations. Also, the researcher ensured the dependability and reliability of information gathered from direct observation by selecting randomly two other people in each community to assist in engaging in observation activities. The researcher recorded some of these direct observations in a field diary to ensure credibility of the study.

Boateng (2018) purported that one limitation of observation is its reliability but one way of solving that challenge is the use of multiple observers.

Semi-structured interviews on the other hand are carried out using documented questions which are open-ended and the order of presentation is known. It is more flexible and gives room for impromptu questions (Swensen, 2014). Interview guide questions based on expert approval facilitated the conduct of semi-structured interviews with the participants in each community of the study area. Three sets of interview guide questions were developed and were based on the research questions of the study. The interview guide questions were categorized according to those who produce and sell cashew locally (farmers), those who buy cashew from the farmers (middlemen or aggregators) and finally those who export cashew (Jorom commodities limited and Olam Ghana). The interview guides were made up of open-ended questions. when open-ended

questions are used, it removes the level of bias that could happen as a result of suggesting responses to participants (Ursa et al., 2003). The researcher made efforts to avoid leading questions but listen more to the participants and record responses to maintain the integrity of the study. Below is a description of how the interview guide questions were designed and what each of the guide entail. The interview guide questions for farmers was made up of four main headings, each heading with sub questions to it. The headings were outlined as follows;

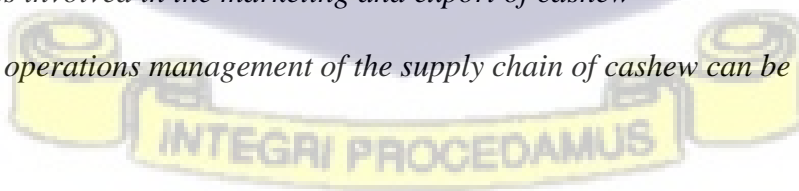
- ❖ *Information on demographic data.*
- ❖ *process involved in the supply chain of cashew*
- ❖ *challenges involved in the production and marketing of cashew nut*
- ❖ *Recommended ways to improve operations of the supply chain of cashew.*

The interview guide questions for middlemen or aggregators had two main headings with sub questions to each heading. These headings were;

- ❖ *Processes involved in the supply chain of cashew from their perspective.*
- ❖ *challenges involved in the buying and marketing of cashew*

Interview guide questions for those who export cashew nuts (Olam Ghana and Jorom commodities company limited) was also made up three main headings and sub questions to each heading. These headings included;

- ❖ *processes involved in the cashew supply chain*
- ❖ *challenges involved in the marketing and export of cashew*
- ❖ *Ways the operations management of the supply chain of cashew can be improved.*



4.7 Data Collection Procedure and Analysis

The researcher began data collection from the 15th of March to the 11th of April 2021 and was resident at Tabiesi. This date was deemed suitable because activities of cashew are usually intense from the month of February to April in the Upper West region with influx of buyers, both middlemen and companies in the various districts. Normally, they move from one community to the other to buy the cashew nuts until their desired quantity is reached. Permission was taken from the Chief and district Agricultural office before carrying out the field research and it facilitated smooth progress of the exercise. The stakeholders urged the people to give their maximum support and attention to the researcher.

To ensure ease in the data analysis process, the researcher went along with 60 interview guide questions, 50 and 10 for Farmers and Middlemen respectively. On each day throughout the period, 12 research interview guide questions were taken to each community, 10 for Farmers and 2 for middlemen. Also, the name of community was written on each interview guide for every community the researcher went to. Numbers instead of names were also used to represent each participant of the study to ensure confidentiality.

Tabiesi was the first community visited then Issa, Wogu, followed by Fian, then finally to Owlo. The researcher visited the communities in these orders due to the proximity of the communities to one another. During the data collection, participants were interviewed mostly on their cashew farms and few of them at their homes.

Nevertheless, this procedure was different for that of the exporting companies selected as part of the sample. Formal letters as stated in the ethical considerations was submitted to the human resource division of the respective companies. Follow ups were made and a scheduled appointment was given to the researcher to undertake the interview.

4.8 Ethical Considerations

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CHAPTER FIVE

DATA ANALYSIS AND PRESENTATION

5.0 Data Analysis

Data analysis follows a systematic way in order to make meaning and develop understanding. In a qualitative research, there are several ways of analyzing data that have been collected. Boateng (2018) enumerates the various methods of qualitative data analysis and some of them include; Miles and Huberman data analysis method, thematic analysis, Yin's data analysis approach amongst others. Qualitative Data analysis is basically about transforming raw data to make meaning and is carried out by collecting data, evaluating, coding to categorize data, recognizing themes, drawing relationships and identifying keywords.

The data collected for this study was analyzed separately according to the populations studied, thus: farmers, middlemen and exporters. In this study, Miles and Huberman's data analysis technique was used to carry out the data analysis process. It is explained as the "process of selecting, focusing, simplifying, abstracting and or transforming the data that appear in the full corpus of written-up field notes, interview transcripts, documents and other empirical materials" (Huberman et al., 2013). Miles and Huberman's Data analysis is carried out in three stages. The first is known as the early stages. At this stage, the researcher edits, separates and classifies the data collected from all the selected communities. This stage was possible because, the researcher indicated the names of the communities on the interview guides.

This is followed by the coding stage. Coding can be done either manually or using a software. However, the former approach is more intensive and time consuming. Some of the software that can be used for coding include, NVivo, Max QDA and the likes. NVivo was employed in this

study because it was user friendly and available for use. Here, the researcher assigned meaningful labels to each heading on the interview guide for each of the study populations. This made it possible for the researcher to categorize responses from participants pertaining to each heading of each of the study populations. This made it easy to make comparisons and to identify similarities, relationships and vital statements the various participants made. The researcher then put the information together in a more succinct manner. Summary of the data collected from the various participants was necessary because, series of the data collected hammered on the same issue. The final stage of Mills and Huberman's procedure is memoing. This stage was carried out by presenting field data that were identified to have a link with literature either confirming or disapproving data collected from the field. Nevertheless, to ensure clarity and understanding, data was further organized and summarized in tables, graphs and figures. Boateng (2014) assert that data display ensures a concise and well-organized data to help establish themes which will in turn serve as a basis for future analysis.

5.1 Research findings

5.1.1 Introduction

This section presents the findings for this study. As stated in previous chapters, the purpose of this study is to examine the supply chain of cashew in Ghana, using Upper West region as a case study. The research focuses on response from the semi-structured interview for farmers, middlemen and exporters. The findings are made up of the demographic characteristics of the cashew farmers, and responses to the three research questions, which include; processes involve in the cashew supply chain, limitations faced by cashew farmers in the Daffiama-Bussie-Issa district, middlemen and the selected exporters. 684822

5.2 Demographic Characteristics of Farmers

The main demographic data that were presented and discussed under this section include gender of the farmers, their ages, number of years they have been engaged in the production of cashew, educational level of the farmers and the sizes of their farms. Tables 5. 1 and 5. 2 below, present the various demographic characteristics of male and female farmers respectively.

Table. 5.1 Demographic Characteristics of Farmers (Male).

Demographic variable	Frequency (25)	Percentage (%)
Respondents:		
Number	25	100
Age (in years)		
Below 18	2	8
18 – 25	0	0
26 - 35	4	16
36 - 45	15	60
46 and above	4	16
	25	100
Years engaged in cashew farming		
1 – 5	0	0
	16	64

6 - 11	9	36
12 and above		
	25	100
Educational Level		
Non-Formal	16	64
University	9	36
	25	100
Size of cashew Land (acres)		
Below 5	4	16
5 - 10	15	60
11 and Above	6	24
	25	100

Source: Field Data, (2021)

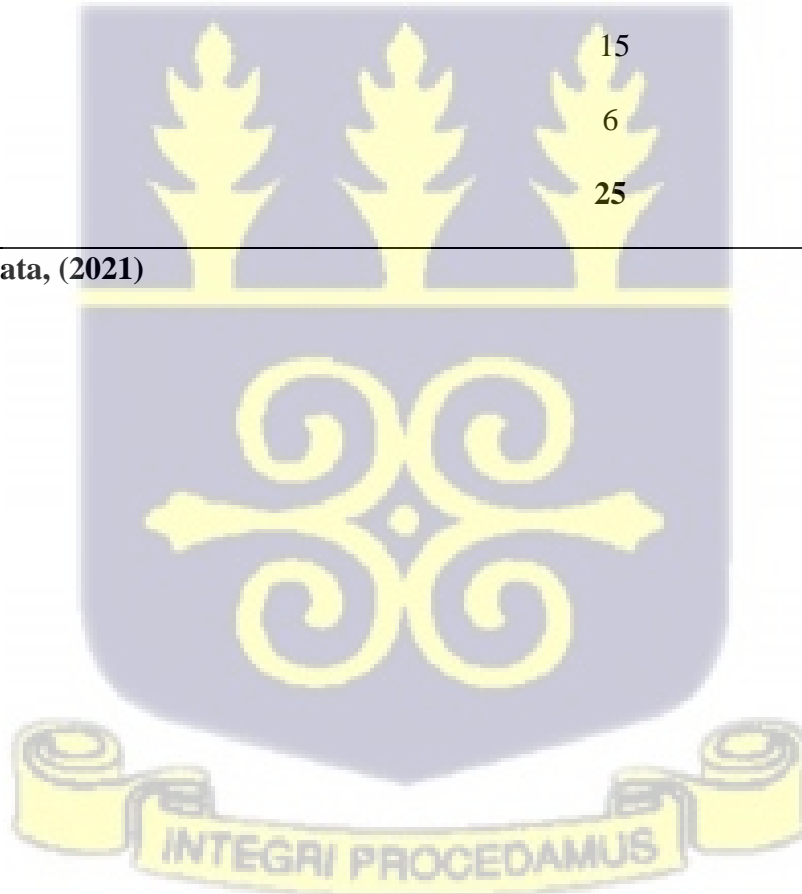


Table. 5.2 Demographic Characteristics of Farmers (Female)

Demographic variable	Frequency (25)	Percentage (%)
Respondents:		
Number	25	100
Age (in years)		
Below 18	0	0
18 – 25	3	12
26 – 35	6	24
36 - 45	13	52
46 and above	3	12
	25	100
Years engaged in cashew farming		
1 - 5	16	64
6 - 11	5	20
12 and above	4	16
	25	100
Educational Level		
Non - Formal	24	96
University	1	4
	25	100
Size of cashew Land (acres)		
Below 5	18	72

5 - 10	4	16
11 and above	3	12
	25	100

Source: Field Data, (2021)

5.2.1 Demographics by Gender

From the research field, it was observed that most of the cashew farms in Tabeisi, Owlo, Issa, Wogu and Fian communities were owned by males. Even though some women own cashew farms, most of the women are rather into the gathering of shea nuts which they use in producing locally made soap known as “*Dagar fanfani*”. This job of gathering shea nuts and processing them into “*Dagar fanfani*” is commonly regarded as one for women. The business in shea nuts is preferred because the shea nut tree grows naturally, is common and is readily available in the Daffiama-Bussie-Issa. The shea nut tree is therefore less costly and less labor intensive unlike cashew which is both capital and labor intensive. However, the researcher made it a point to include twenty- five males and twenty-five females in the interview for the selected communities, giving a total of fifty farmers who participated in the interview. This was to ensure balance and to achieve diversity in perspectives.

Women who own cashew farms especially in Tabiesi community, are mostly educated women. Even though these women are from the Tabiesi community, they are not permanently living there. They come during the farming season between May and August to plant. They then return from February to April after cashews are matured to harvest the cashew nuts. On the other hand, the women who live in the village, do not own lands but their husbands do. Rather, they only go to the farms with their children to help in farm activities such as picking cashew nuts and

carrying them on their heads to their various homes as an alternative to transport by vehicle. One participant who was the District Chief Executive and also a commercial cashew farmer in Tabiesi had this to say;

I am the DCE for this district and a commercial cashew farmer and my farm is in Tabiesi. You see, in Tabiesi for instance most of the women who own farms here are not indigenous citizens of Tabeisi. For our women here, most of them are just interested in the shea nuts and others too, their husbands will not allow them farm. You find most of them too at the various cashew nurseries, pruning and taking care of the immature plants, which is also good. So, I think educated women have high chances of owning and engaging in any farm activity. But we are still trying to encourage more females and their husbands to give them the opportunity to also own farms. For example, last year (2020) the overall best farmer from the district was a female.

Another participant from Fian added that, *I and other farmers were introduced to cashew farming by the Ghana rural Agric cashew enterprise. But most of us were men, with few women. They introduced us to cashew and also trained us on cashew farming and after that, we started involving ourselves in this cashew farming business. Many of the women too always work in the cashew nursery.*

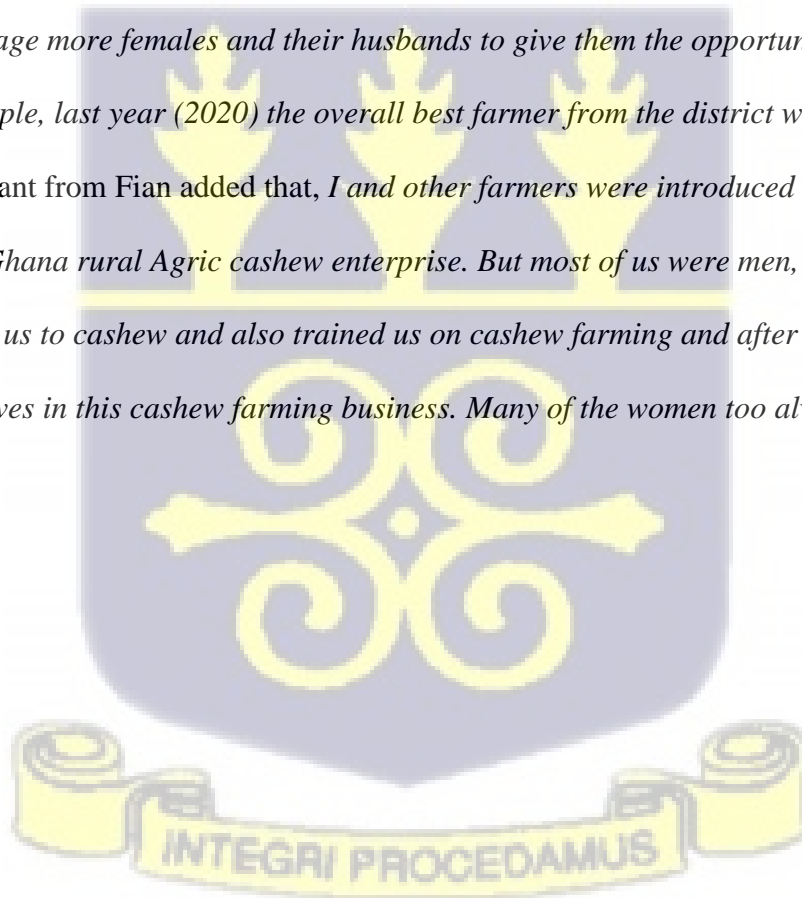


Figure. 5.1



women and children preparing a land for cashew cultivation

Photo: Author, 2021

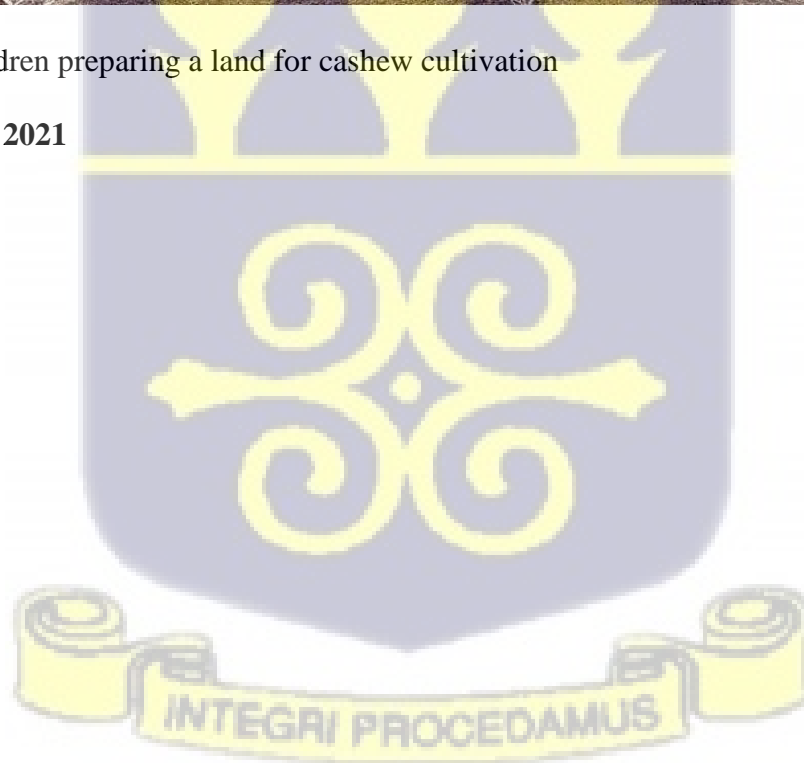


Fig: 5.2



Women working at a cashew nursery in the Daffiama-Bussie-Issa district

Photo: Author, 2021.

5.2.2 Age distribution of farmers

Out of the total number of farmers who were interviewed, majority of the farmers' ages ranged from 36 – 45 years and they were 60 percent and 52 percent of male and females respectively.

There were 19 males aged above 35 years while 16 females were aged above this age.

Interestingly, those who were below 18 years were males and formed 8 percent of the total number of males interviewed. Most young men in the village usually begin living independently

at early stages and get married. Unlike those in the cities, they have no interest in building big houses, buying cars before getting married, or even completing an education. They only need to have one or two farmlands, and a simple house. Some of the young men also prefer to work instead of schooling. For instance, some of them will travel to other towns for the galamsey business. The researcher wanted to understand why older people were into cashew farming than the younger ones and asked one of the participants from Issa community who was 50 years, and he replied: *I am a retired head teacher and I also used to teach agric. I decided to stay here and engage in some Agric activities. As for my cashew farm, I started it long time ago even when I was still in active service. All the plants have now grown into trees and are matured. Now the cashew trees are really helping me in terms of income. It is only this Fulani cattle and thieves who are disturbing.* He further added that cashew is a sustainable crop and will serve many generations to come. Another participant who was above 50 years and a farmer from Wogu said, *I have been farming cashew long time. But that time, we didn't see its use, we didn't know it will give us more money so we just planted the trees so that they will block fire from entering our farms. We were only farming more maize, beans, yams and rice. But now that we have seen the usefulness of the cashew plant, my children are now taking care of them and we are getting small small money from them.*

5.2.3 Years engaged in cashew farming

Out of the total number of farmers who were interviewed, 64 percent formed majority of the female and male cashew farmers who had been in cashew farming from 1 – 5 and 6 – 11 years respectively. Since the inception of cashew farming in the Daffiama –Bussie –Issa district, and the government's initiative of planting for exports and rural development in 2018, most women

were given jobs at the cashew nursery, where cashew seedlings were nursed before the farming season to distribute freely to farmers. This offered most of the women the opportunity to raise their own cashew farms, especially considering the fact that, the seedlings were given for free. Of the female farmers, 4 (16%) have been in the cultivation of cashew for 12 and more years, while there were 9 (36%) of the male farmers (36%). This can be attributed to the fact that previously, majority of the farmers did not consider cashew farming as a profitable business. Hence, most of them cultivated food crops like maize, beans, rice, sorghum, and yam instead of planting cash crops like cashew to earn a sustainable living. However, the status quo has changed in recent times as many farmers have expressed their interest in cashew production having realized the economic potential of the crop.

One farmer from Owlo had stated how she got in the cashew business and confirmed how cashew farming has helped and supported her and the family. She had this to say, *since I started this cashew business, it really helps me and my family. You know here, we only farm once, after that, the dry season. And that is the time we start harvesting and sell the cashew nut.*

Another participant who had been farming cashew for a long time had this to say; *my brother started farming cashew since the year 2000 and has a large cashew plantation in Tabiesi. He used to farm cashew a lot in Techiman, and Wenchi before he came back to the village to farm. He was one of the people who started this cashew business in Upper West Region and in fact it helped him very much. He even won national best farmer twice because of this cashew until he died. I used to work at the local assembly secretariat but I resigned to take over from where he stopped. Since then till now, we have expanded to other communities and we manage other cashew farmers in most of the communities. The name of our company is Antika and located in Wa.*

5.2.4 Educational level of Farmers

Out of the total number of farmers who were interviewed, most of the farmers who had no formal education were females. Most females in the district are usually betrothed at their birth and as such, given out in marriage at early ages instead of being in school. Even though some parents in the Daffiama-Bussie-Issa district have realized in recent times, the need to send not only their male children but female children to school, this practice of early marriage is still prevalent in the Daffiama-Bussie-Issa district as well as some other districts like Sissala East district in the Upper West region. On the other hand, 64 percent of the male cashew farmers had no formal education. These male farmers concentrated their efforts in farm activities and animal rearing. They usually sold cooked cow or goat meat especially during market days. Across all selected communities, you could find at least one meat joint around. From the interviews, the researcher discovered that the farmers valued education for their children and are willing to have them go through school. But since they have not the opportunities and educational materials they prefer their children work on the farmlands with them. When the researcher asked why that was the case, one participant stated: *this our place, I have never seen many teachers here like the nurses they bring here. When they post teachers here, they don't come because they say here is a village, so even those who are here now are not many.* Most of these school children on the other hand loose interest in schooling and they grow up not going through any form of formal education.



5.2.5 Size of cashew farms

Acquiring lands for cultivation is a difficult process especially for females in the Daffiama-Bussie-Issa district. From Table 5. 2 above, 72 percent was the highest for female cashew farmers whose cashew lands were below 5 acres and most of them were from Owlo and Issa communities. Followed by 60 percent of male cashew farmers who owned between 6 and 10 acres of cashew lands and were mostly from Tabeisi and Wogu communities. The variation in cashew farmlands is as a result of the challenges involved in getting larger lands to cultivate and the difficulties in getting the needed labor. The researcher probed further to find out why that was a problem and a participant asserted: *in fact, getting more lands here is not easy but getting people to work, even if you get more land to farm is the bigger problem. Most of us here are farmers and we do the work ourselves. When it is farming season, everybody is busy working on their lands. But if you go to Wenchi and other places, they have people you can pay so that they will work for you. And as you can see, we don't have machines and all our work is man power.* Another participant puts it this way: *my husband has many lands and I cannot tell him how many acres I want. He will give you how many he wants. So, he gives me 3 acres of the land. After that NGO people (Ghana Rural Agric Cashew Enterprise) train us, I use the land to plant the cashew.*



Below is a ten acre of land being cleared up by a farmer in Tabeisi to undertake cashew farming.

Figure 5.3



A ten-acre field being cleared for cashew farming.

Photo: Author, 2021

5.3 Processes involved in the supply chain of cashew in the Upper West region

5.3.1 Farmer perspective (production to marketing)

Cashews in the Upper West region are usually planted during the months of May, June and July when the rains are intense. Before then, a suitable land is cleared and ploughed after which, the farmer has to undertake lining and pegging to ensure that plants are planted in orderly manner.

This process is carried out by Extension Officers. The farmer then has to wait for rain after which he has to give a day interval to enable the land adequately absorb the water before planting can take place. From observation, Cashew farmers in the Daffiama-Bussie-Issa district usually pick their cashew plants from the various cashew nurseries. Some of the cashew nurseries are located in Daffiama, Jenpensi and Samambo. For the selected communities, Tabiesi, Issa, Fian, Wogu and Owlo, the closest cashew nursery is Samambo cashew nursery.

One cashew farmer puts it this way, *when the farming time is getting close, we go to the district Agric office to register our names and the number of plants we want. After that we go to Samambo to pick the cashew plants. But that place is very far, but is nearer to us than Daffiama and the other places.*



Figure 5.4 *The Cashew nursery at Samambo.*

Below is a picture of the cashew nursery at Samambo.



Photo: Author, 2021

Some cashew farmers also prefer to buy the cashew seedlings from private nursery operators because, according to them, those are of high quality and have high yielding capacity compared to the ones given for free. This is what the cashew nursery operator had to say: *for me i was trained by an NGO on how to graft cashew seedlings, and since then I spend a lot of time and quality materials to grow the seedlings. I usually sell one plant for 4 Ghana cedi but I give discount to farmers who have ten acres and above. Most of the farmers who are aware of the difference between my seedlings and the one they give for free always prefer to buy my own.* The picture below is a cashew nursery owned by a private operator called Nipawura farms.

Figure. 5.5 Women and children nursing cashew owned by Nipawura farms.



Photo: Author, 2021



Figure. 5.6



Cashew nursing ongoing.

Photo: Author, 2021



Figure. 5.7



Nursed cashew seedlings.

Photo: Author, 2021

The researcher wanted to further find out how the farmers carry out their farm activities. It was revealed that a good number of the farmers use their families to carry out farm activities. Thus, weeding, clearing, planting, spraying, watering and the likes. One of the participants explained: *I always carry my family to the farm to help. The women will cook for us and the children will be using the hoe and stick to make the holes then we the big people will be planting the cashew. I have three wives and fourteen children and we all stay in one compound. That's why me I marry plenty.*

Another participant added, *as for here, because we do not have machines and those things, we always go to farm with our families.* When the cashew is fully matured and ready for harvest, the farmers go to the field with their wives and children to pick the fallen nuts, and carry on their heads with pans to their homes or with the use of a tricycle for those who have one. However, in an event where there is a bumper harvest, cashew is left at the field due to inadequate storage to hold many bags of cashew nuts. All other things being equal, with good agronomic practice, a cashew farmer should get about twenty to twenty-five bags of cashew nuts per acre. Thus, those who have ten acres and more, are able to earn high income.

Cashew nuts are either sold in local markets during markets days or directly to companies or through associations. A participant asserted, *well some of the cashew farmers take their cashew nuts to the market to sell while others sell their cashew nuts directly to companies and Non-governmental organizations like GIZ Ghana, Olam, and Nipawura. This is because they usually give the farmers inputs like compost fertilizer, machinery, sometimes in form of loan and trainings for the farmers to carry out their farm work, so that when it is harvest time, they come to collect their supplies. But since the introduction of cashew industry association of Ghana (CIAG) we have been trying to get all the cashew farmers under the umbrella of CIAG. Even now, most of the farmers prefer to sell their harvested cashew through CIAG.* The researcher also asked about the issue of price of cashew nuts and this was the feedback from a participant: *We are always fighting with these middlemen especially when they come around to buy our cashew nuts. In fact, this price thing is a problem for me because I spend on my farm too much. But this year it was better because my group, CIAG gave us certain prices to sell our produce.*

The regional president of CIAG confirmed that: *this year (2021), cashew farm gate price is between 6.00 Ghana cedi to 8.00 Ghana cedi per kilo. Cashew farmers are not supposed to sell*

below this price and this is from cashew industry association of Ghana (CIAG) endorsed by tree crop board. Furthermore, Profit from cashew nut depends on the number of land acreages cultivated; For an 800 acre of cashew field, the total number of trees planted will be 32,000 trees, thus 40×800 , where 40 represent the number of trees an acre takes. So out of the 32,000 trees transplanted, 80 percent of the trees are expected to survive due to harsh weather conditions or some plants may be defective. This 80 percent survived trees will now give a total of 25,600, thus: $(80/100 \times 32,000)$ trees at first harvest. Again, one tree is projected to give three bags of 100kg cashew nuts at a price of GH¢800 per bag at current market rate (2021). Which means that, One tree will give an amount of GH¢2,400 (thus $\text{GHC}800 \times 3$ bags) at present value (2021) every year for the next 35 years starting from the year of harvest. Additionally, GH¢800 per 100kg bag multiplied by 25,600 surviving trees at first harvest translates into GH¢20,480,000 income each year.



Figure: 5.8 Some harvested cashew nuts and a typical matured cashew



Photo: Author, 2021



Figure: 5.9 An immature cashew.



Photo: Author, 2021

Cashew farming has created an impact on farmers due to the immense benefit most of them have derived from it. A farmer said: *This cashew has really helped me and my family very much. More especially in the dry season, we cannot farm maize, yam and those things so it is only cashew we harvest and sell around that time.*

Another participant: *farming cashew is hard too much but if you get money and the machine, you will enjoy it. Because cashew get plenty money.*

Again, a participant added: *I intend expanding my cashew plantation to hopefully twenty acres because it is very valuable.* Results from the interviews revealed that farmers depended on other activities as an alternative source of income. Some of the farmers were butchers, others cultivated crops such as maize, yam, beans and rice. Cashew served as an all year-round source of income especially during the harmattan.

5.3.2 Middlemen or Aggregator's perspective (buying to marketing)

Middlemen are individuals or group of individuals who go to various communities during harvest season to buy cashew nuts from farmers. They usually have intended quantities of cashew nuts to buy in order to meet the demands of their customers. On a good day, a middleman is able to buy his or her intended quantity of cashew nuts in a day. On the other hand, buying can also take up to a month or more especially in times when the cashew nuts are scarce. In that case, getting moderate quantity of the cashew nuts is almost impossible. These middlemen usually have their own price they intend to buy the cashew nuts from farmers and this is as a result of the absence of a fixed price for cashew nuts in Ghana.

Before a middleman or Aggregator sets out to buy cashew nuts, he or she would have a contact person in a community or some communities to find out the availability of cashew nuts and place to stay in case buying takes longer periods than planned. They will have a place to keep their purchased cashew nuts until they buy their intended quantity. Nevertheless, some middlemen who work directly for companies, move around from one community to the other with a truck to collect cashew nuts from farmers who are registered under the company. This usually takes them a day to complete total quantity. Some other middlemen move from community to community using motor bikes which is usually very tiring and costly and has a high possibility of not reaching target quantity. Some middlemen from the Tabeisi, Issa, Owlo, Wogu and Fian communities share their views.

A middleman from Issa community shared his view: *I have been buying this cashew nuts for a long time now and it gives me money. I roam from one community to the other with a motorbike buying the cashew nuts until I reach my total. After that, I transport them with the truck they call*

long vehicle to Techiman and Wechi areas. I sometimes also sell to Gyarko farms and also some people who offer good price.

Another middle man from Wogu said: in fact, I work for a private company called Fiavor. So, I use the truck to go around to pick our supplies from our farmers and also buy some. It takes us one day. After that, we transport them to the Wa office of the company. The community that we get more cashew nut is Owlo.

This middleman also had this to say: I always go with my measuring scale to buy the cashew nuts from the communities because the farmers do not have their own measuring scale. But we still fight with them because of price.

In addition, one middleman complained that: these cashew farmers, sometimes when you go to them, they don't want to sell because they think your price is small but they don't understand. Some people come from Burkina and Leo to the communities and they offer big price to the farmers. They always spoil the market for us. The farmers too when they hear big price, they will not sell to you but will be selling to those offering higher prices. They don't understand that, we are their regular customers but the people who come, only come once in a while. As for the farmers all they think about is money. On a good day, the middlemen are able to buy and transport about fifty to hundred bags of cashew nuts in total from the Daffiama-Bussie-Issa district. The quantity is however, not impressive to an extent. One striking thing the researcher noticed was that, indeed there were a lot of cashew farmers in the Daffiama-Bussie-Issa district but their cashew plants were either not yielding much or their cashew plantations were small size.

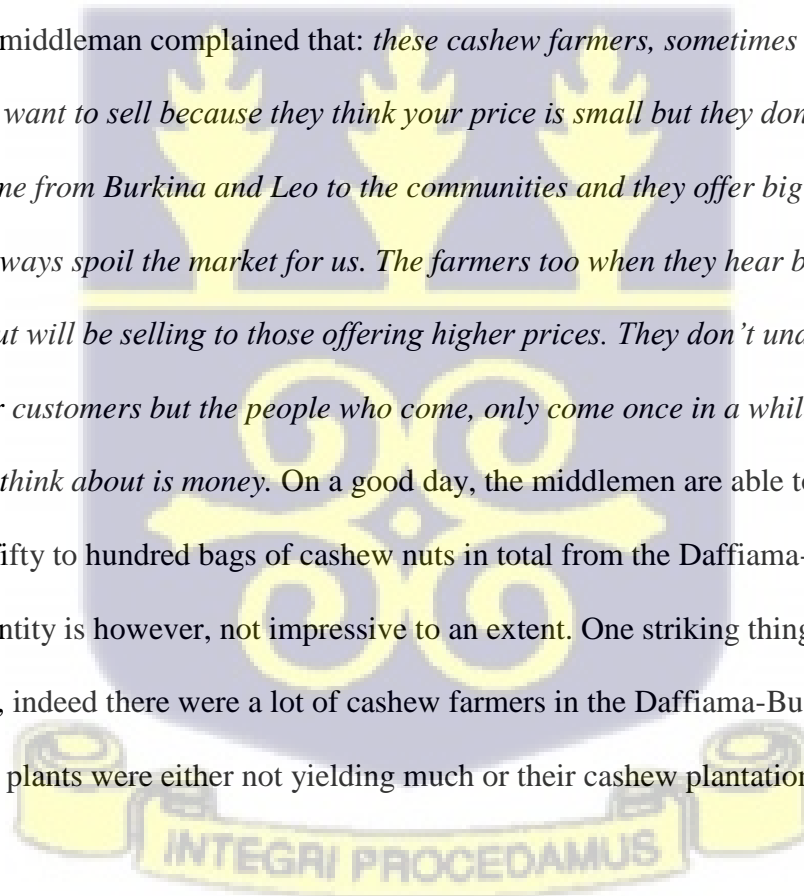


Figure. 5.10



Below is a picture of a truck that some middlemen usually use to transport the purchased cashew nuts to destinations.

Photo: Author, 2021

5.3.3 Exporters perspective (buying to exports)

Exporters of cashew nuts buy their cashew nuts either directly from the farmers or from the middlemen. A typical example is Olam. Olam has its nucleus farmers and supplies them with some agricultural inputs to enable them undertake their farm activities. This is mostly in the form

of loans, so that when it is time for harvest they supply them with an agreed quantity of cashew nuts. Olam also organizes trainings for their farmers. Olam is an Agric-commodity and packaged foods international company that began its operations in Ghana in 1994 and the main commodities they deal in include: Cashew, cocoa, tomato paste, biscuits, and grains.

We assist our cashew farmers in many regions across Ghana, to tackle certain challenges undermining effective production of cashew, poor quality and access to markets.

From the research, Olam officials revealed that, prior to the farming season they organize and register farmers to form a group in order to take them through training on good agricultural practices to enable them increase yield and also prevent post-harvest loses amongst others. They added that, in 2019 over thirty programs were rolled out on twelve different topics which were attended by over 3,500 Farmers. One of the ways they carry this out is through one of their technological applications known as AtSource. The application enables them take data of farmers by registering them, and supplying them with quality inputs to enable the farmers carry out their farm activities. Since the development of the application, over 5,400 farmers were registered on the system, giving them access to transparent pricing, agricultural inputs as well as advices on best farm practices and this, according to Olam has choked success evident in the performance and income of their registered farmers. This is how they described their supply chain process. *Usually, we collect the cashew nuts from farmers registered under us, and then transport the produce to our warehouses. And every Olam owned warehouse has well equipped drying and packing machines which enable us maintain quality of the product making it suitable for export to our customers.* They added that they had some middlemen, whom they referred to as micro-collectors who are employed on contract basis to collect the cashew nuts from farmers and another way of creating local employment for people in various districts of the Upper West region where their

operations are carried out. *We have micro-collectors in the Daffiama-Bussie-Issa district, Sissala East, Jirapa, Wa West and we are still extending our activities to other districts in the region.*

Cashew nuts from Olam in Ghana are exported to Vietnam, Togo, Burkina Faso, Niger and India.

In the same vein, Jorom commodities limited, an exporter of cashew nuts describes their cashew supply chain process. According to the Director, Jorom commodities has been in the export of cashew business for four years and they usually export cashew nuts on yearly basis. He

explained that, they get their cashew nuts from the farmers or middlemen whom he described as “cash and carry traders”. He further added that, the purchased cashew nuts are stored in their

warehouse at the field and in their second warehouse at Tema, where it takes about two weeks before they are exported. However, this depends on the contract they have with the buyers.

Vietnam and India are export destinations for Jorom commodities.

With regards to their export history, Jorom commodities has exported 200MT (metric tons) worth of cashew nuts in previous years and in 2021 it has a contract to export 5000MT worth of cashew nuts. However, officials of both exporters pointed out that local supply of cashew nuts does not meet their demand and as such demand in the international market is never met.

The researcher wanted to find out about how they determine price for the cashew nuts, and this was the response from a participant: *prices are determined based on a number of factors: one is, it is determined by the exporters and their contracts. Secondly, determination of floor price from La Cote d'ivoire and finally, demand and supply at the local front.* Identifying quality as a major

aspect of every product, the researcher asked the exporters how they test for quality of cashew nuts before exporting and if there are any parameters to look out for. This was what a participant from Jorom commodities had to say: *testing for quality is done by our field officers first and then finally a third person who is an SGS, (Société Générale de Surveillance). SGS is an international*

inspection agency which works across the world in the field of improving quality and productivity, reducing risks and verifying compliance. The parameters of importance are: cashew nut count outturn and moisture content. Olam on the other had disclosed that they have a digital procurement system that enabled them deliver quality cashew nuts to their customers. The researcher further asked how long it takes from the time of purchase of the cashew nuts to export and this was the response: it varies so much and also depends on how early the market wants it. If your contract says you should send 1000MT at a time and you have 200MT you have to wait for the 1000MT before exporting by sea. The researcher again, probed deeper on how their cashew consignment is tracked once exported. This was the response: one can track one's goods once they are with the shipping agent. They use an online tracking device so that wherever the goods are, they can be traced. Both cashew exporting companies emphasized on the importance of cashew to Ghana's economic development. This is what the Director from Jorom commodities had to say: cashew has been and still is the leading non-traditional export crop for Ghana for many years now. It provides employment and earns foreign exchange for Ghana.

5.4 Challenges faced in the cashew supply chain

Upon responses from the participants, it was discovered that, all farmers across the five selected communities, Tabeisi, Owlo, Wogu, Fian and Issa identified same problems they encounter in cashew supply chain, with majority of them hammering on the issue of price instability. Issues that were raised by the farmers included: lack of storage, pest infestation, lack of irrigational systems, ineffective cashew seedlings, lack of Extension officers, unstable pricing, lack of sustainable machinery or technology to process nuts.

Some of the participants (farmers) had this to say: *for us, we have no room to store our cashew nuts so we always leave them at the farm. Anytime our customers want to buy, we go and gather them with our families and we put them in bags for them. And it is not easy, because when you leave the cashew there like that people always come and steal, if you don't even take time, they can burn the farm.*

Another participant pointed out on the issue of ineffective cashew seedlings and how that was draining him financially. He said: *I have really seen the difference between the cashew plants they give us for free and the one other people buy. I planted my cashew since 2019 and we are in 2021 now and still no change. I went to my friend's cashew farm at Owlo and his own is growing big and flowering, ready to fruit. But my own is still like that, meanwhile we plant our cashew in the same year.*

From Figure 5.11 below, it can be observed that, cashew plants that were planted by different farmers in different communities (Tabiesi and Owlo) but planted in the same year (2019) had huge differences.

Again, a participant expressed displeasure about the rate of pest infestation. This is what she had to say: *those diseases that come on the plants are disturbing us too much. And the chemicals too that they use to kill them are expensive, if not this GEPA people who are even helping us through our CIAG group to spray our cashew for free every three months in a year, like I don't know what will happen.*

Furthermore, a participant said: *we have just two extension officers in the whole of Daffiama-Bussie-Issa. This does not make the services they render effective and beneficial. In a case where a farmer has about two or more acres of land, the extension officer is required to exhaust the entire land before moving on to the next farmer. This makes it almost impossible to render*

services to all farmers across the various communities hence majority of farmers are unable to go through trainings or even receive field visits from the extension officers. As a result, farmers end up misusing farm inputs and attracting extra cost.

A farmer added that: the cashew fruits are always going wasted because we don't have the machines they use to process them. Figure 5.12 below, shows a picture of some cashew fruits being wasted.

Figure. 5.11



A cashew plant in 2019 till 2021 (Tabiesi).

A cashew plant in 2019 to 2021 (Owlo).

Photo: Author, 2021

Figure. 5.12 *Some wasted cashew fruits.*



Photo: Author, 2021

The middlemen on the other hand, basically complained about the bad road networks in the district, especially roads leading to the communities. They also mentioned the issue of pricing as being a major challenge. A middleman who usually comes from Accra to buy cashew nuts said: *I used to roam around all these communities and even beyond with my car to buy the cashew nuts. But I realized that these farmers, because of my car, they just mention any huge price because they feel you have money. I noticed it and decided to stop using my car and use a motorbike instead. And the situation was different. So, the issue especially has to do with pricing. If everyone knows how much this cost, we will not have a problem.*

However, with the Exporters, this is what they had to say about the challenges they encounter in the business of cashew nuts: *The goods are hard to come by in Ghana and moreover, the price fluctuations of cashew nuts do not help in planning.*

Figure. 5.13 A pest infected cashew plant.



Photo: Author, 2021



CHAPTER SIX

DISCUSSION OF FINDINGS

6.0 Introduction

This chapter discusses the analysis of the findings in relation to existing literature so as to properly address the research objectives. The study seeks to examine the processes involved in the cashew supply chain in the Upper West region. It also sought to investigate the challenges involved in the cashew nut supply chain. In this chapter, findings from the field research are discussed according to each research objective.

6.1 Processes involved in the cashew nut supply chain in the Upper West region.

6.1.1 Farmer's Perspective (Planting and caring of plants)

The analysis of the data revealed that cashews are planted in the Upper West region between the months of May and August when the rains are intense. Farmers who usually undertake cashew production, intercrop with other crops such as maize, beans and yam which also serve as a source of nutrients to the growth of cashew plants. In cashew production, Farmers can either use the grafted cashew seedlings for transplanting or sow with the cashew seed nuts itself. However, in the case of farmers in the Daffiama-Bussie-Issa (DBI) district, grafted cashew seedlings are predominantly used by the farmers. Temporal cashew nurseries are normally raised in communities that have easy access to water. Cashew seedlings are distributed to the various nurseries where the seedlings are grafted, nursed and propagated. From the study, these activities are mostly carried out by women and children. In 2019 and 2020, cashew nurseries raised in the

Daffiama-Bussie-Issa district were located in Samambo, Jenpensi, and Daffiama communities. The grafted cashews are then distributed for free to cashew farmers in the district when it is the season for planting. This is usually between May and August. This free distribution of grafted cashew plants is an initiative implemented by the Government of Ghana called “planting for export and rural development”. Some farmers also prefer to buy grafted cashew seedlings from private persons or companies with the view that, their cashew plants yield faster as compared to those given freely. As indicated in the findings, some of these private entities include, Nipawura farms and Saeed farms. From the analysis of the findings, it is asserted that cashew farmers in the region lack the requisite skills to adequately undertake their cashew farm activities, hence depend on Extension officers whose services are difficult to access because there are limited number of them in the Upper West Region. Cashew is a unique plant and its cultivation requires some level of skill and technique so as to obtain high yield and quality. Muniu et al., (2019) points out that cashew plants spacing usually should begin with 6m by 6m initially and later thinning plants to a length of 12 by 12m (meters) away from each. This is because the plants grow into trees and form a crown-like or canopy shape. Azam – Ali & Judge (2001) also postulates that, with grafted cashew plant, the farmer is required to dig a hole with depth of about 7cm to 10cm, and with a knife, carefully cut open the black polythene wrapped on the plant from the base and place it in the hole while taking out the black polythene from the top of the plant. Hence cashew farmers require adequate training and education to enable them carry out their activities independently. The study findings also discovered that, even though cashew farmers planted same cashew plants, there were differences in growth characteristics. This was confirmed by (Kapinga et al., 2017), where they categorized Cashew plants into two types namely, *Common or glant type and the dwarf type*. Common cashew types are predominantly used by

most cashew growing countries and they require wide spacing and high fertile soil for effective growth. Flowering usually begins between two to three years after planting. Whereas Dwarf cashew type are rare and have high yielding capacity. This type begins flowering between six months and one and half years after planting. Muniu et al., (2019) also added that, Cashew plants do not mature at the same time. Cashews that are planted using seedlings start bearing fruits three to four years after transplanting whereas the grafted cashew seedlings begin fruiting two years after transplanting. These variations in cashew plants are what is contributing to the differences in cashew plants amongst cashew farmers in the Daffiama-Bussie-Issa district. A cashew farmer gets his capacity of yield depending on the number of acres the farmer has. For instance, on a ten-acre field, each acre will take forty cashew plants giving a total of four hundred trees. With good agronomic practice and effective cashew plants or seedlings, each cashew tree is projected to produce a total of three bags of cashew nuts, where each bag weighs 100 kg.

6.1.2 Harvesting

Cashew nuts in the Upper West Region are harvested from November to May with the bumper harvest occurring from November to January. During that period, cashew farmers in the DBI district go with their wives and children to pick and gather fallen nuts on the ground, and sometimes use long sticks to pluck down matured cashew. Meanwhile, Muniu et al., (2019) describes the appropriate method of harvesting cashew nuts and it involves clearing areas beneath each cashew tree, gather fallen cashew nuts and then finally, detaching the nut from the apple. They also added that, even though the productive lifespan of cashew trees spans up to forty years, its commercial use is for thirty-five years.

6.1.3 Storage

Ensuring effective packaging of cashew nuts is essential in maintaining its quality, especially to prevent product damage or deterioration. This helps in gaining better quality and higher product value in addition. Optimal storage conditions are important so as to maintain the product properties (International nut council, 2016). Cashew nuts need to be stored in a well ventilated and spacious facility so as to maintain the quality and nutritional value of the nut. The process of storage should be carried out by well trained personnel. Nevertheless, in the case of cashew farmers in the Upper West Region, there are no such favorable storage facilities. Majority of the respondents in this study disclosed how they leave their cashew nuts in the farms and only harvest upon demand. Other farmers store the harvested cashew nuts in their local thatched huts. After harvest of the cashew nuts, farmers transport the produce to local markets using moto king where they sell to middlemen and cashew exporting companies.

6.1.4 Middlemen or Aggregator's perspective (Buying or pricing)

Middlemen are the section of the cashew supply chain who buy the nuts from cashew farmers during the harvest season. From the findings, most of the Aggregator's in the communities were predominantly men and they moved from one community to another to buy cashew nuts. This is because prices and quantity of cashew nuts vary from community to community. Keller (2010) postulates that the presence of intermediaries or agents acting between farmers or traders, exporters and processing companies provides them with vital market information and market deals needed to push forth their businesses. This has resulted in middlemen playing an important role in the marketing of cashew nuts. Even though a respondent in this study stressed on the issue of reluctance of cashew farmers to sell their cashew nuts due to price disagreement, Evans et al.,

(2014) disclosed in the findings of their study about the plight of cashew farmers. The authors further added that cashew farmers were losing out to intermediaries and export companies who subduced the prices of the cashew nuts. The authors then called for government intervention to regulate prices so as to ensure fair deals. It is in this regard that some of the cashew exporting companies like Olam prefer working directly with farmers so that at the end of the day, they get their supplies directly from the farmers. Some of these exporting companies have automated mobile systems where all details of farmers across different regions and communities they work with are stored unto. When the period of planting is close, they then supply each farmer with the inputs which include, grafted cashew plants, weedicide, pesticide per the number of acreages each farmer has. They render extension services to them as well as trainings on proper agronomic practices so as to obtain good yield during harvest.

6.1.5 Exporter's Perspective

Exporters of cashew nuts in Ghana usually get supply of their cashew nuts either directly from farmers or from middlemen. These are then stored in their warehouses for a specific period of time before they are exported to various destinations. Nevertheless, before cashew nuts are exported, they have to pass through some quality assessment. One of the exporters disclosed that to achieve high quality cashew nuts from the source, these farmers are required to dry the cashew nuts under the sun for about two hours before they are considered suitable for purchase. The process of ensuring that cashew nuts are well dried is carried out by field officers of the various exporting companies. According to literature, cashew nuts are graded in to two, thus Fair Average Quality (FAQ) and Under Grade (UG). FAQ cashew nuts are described as well matured cashew nuts which should be heavy and well dried (12% moisture content). With the color being

grey or pale brown and should neither be wrinkled nor spotted. On the other hand, UG cashew nuts should also be adequately dried and they can be spotted but not wrinkled. Nevertheless other grading systems can be used depending on the buyer (Muniu et al., 2019).

Cashew nuts in Ghana are undoubtedly contributing massively to Ghana's economic growth and development. For instance, cashew production in Africa in 2020 exceeded the 2.1 million kilograms it initially produced in 2019. However, in Ghana, according to the Ghana export promotion authority's 2019 report, cashew nuts were the second highest earner of top ten products to non-traditional export product. In addition, projections from the African Cashew Alliance concerning the production of cashew nuts in 2021 points out production of cashew nuts is envisaged to be 120,000 tons, which is slightly higher than that of 2020. They attributed it to the fact that, 2021 has a favorable weather condition which is good for cashew production and as such cashew farmers are likely to make higher yields. Again, from the findings, cashew nuts exporters confirmed the profitability of cashews but they stressed on the issue of production of cashew nuts from Ghana not being able to meet demand in the international market. John et al., (2018) revealed that there is an excess in the demand of cashew nuts in the world market with a gap of about 5% per year. And the production of cashew nuts from Ghana is unable to close that gap or meet up with the demand.

6.2 Challenges involved in the production and marketing of cashew nuts in the Upper West region.

The cashew sub sector in Ghana is generally growing remarkably as it serves as a source of income and employment for many in cashew growing areas especially in the Bono East, Ahafo regions, and the Upper West Regions of Ghana. However, actors in the cashew value chain have

expressed displeasure and discontent regarding the cashew nut supply chain, evident from the findings. This challenge is causing a hindrance on the smooth production and supply of cashew nuts in the county. Cashew farmers are advocating for a more responsive and efficient cashew supply chain especially in the wake of the coronavirus pandemic (Sylvia, 2020). There is also the need to ensure sustainability of the cashew nut supply chain (Agyemang et al., 2020). Some of the challenge's cashew farmers lamented on include the following:

6.2.1 Unstable pricing of cashew nuts.

During the study, it was discovered that the issue of price instability was of major challenge and concern for all the three categories of respondents involved in the study. The lack of stable cashew farm gate prices leads to banter between cashew farmers and buyers of cashew nuts. According to an online report dated 28th January 2020 on cashew price regulations from Citi news, it was revealed that the lack of regulation on prices of cashew nuts was creating tensions between cashew farmers and buyers in the Jaman North district of Bono region, where Ghana gets most of her cashew nuts. This issue of pricing of cashew nuts is of great concern especially for the farmers because most farmers in the communities are oblivious of the market prices for the crop hence sell at the aggregator or middleman's price because they have to cater for domestic needs. Unfortunately, this price is relatively lower compared to the market price. This puts the farmer in debt, hence the inability to produce next season or expand. The issue of low prices and the resultant low incomes for cashew farmers in the region deter farmers from working on their farms. This in turn hinders production of cashew nuts which in turn limits contribution to Gross Domestic Product (GDP) as well as negatively affecting living conditions of the farmers. And because most of these farmers resort to loan facilities to maintain their

farms, they are unable to meet their debt timelines. This set back has the potential to cripple the industry and increase the incidence of unemployment and poverty.

6.2.2 Lack of irrigational Systems

Ghana's agricultural sector is heavily dependent on rainfall, but the rainfall pattern is erratic, making the sector a high-risk venture for many investors. The Upper West Region annually experiences a short rainy season and a relatively long dry season (i.e., October to April).

Irrigation is therefore essential for enhancement of agricultural production. A number of earth embankments have been constructed as dams and dug-outs have been excavated throughout the region to create water reservoirs for irrigation, especially for dry season farming. However, the irrigation facilities are beset with problems. From the research findings, the issue of irrigation is also of high concern to cashew farmers. Considering the harsh weather conditions during the harmattan or dry season in the region, farmers usually encounter difficulties in sustaining the plants. This is as a result of lack of irrigational systems to efficiently maintain and keep alive the plants during the dry season in order to obtain high yield and quality of cashew nuts. This will also result in a good number of the plants dying off, attracting another cost for the farmer to undertake replacement of dead cashew plants the following year. Farmers usually implement a traditional system of irrigation which they usually carry out by perforating plastic bottles filled with water and attaching each cashew plant with a bottle. The water in the bottle sustains the plant for three weeks after which it has to be refilled. This process is cumbersome, less effective and time consuming. Effective Irrigation should normally be undertaken from January to March to ensure maximum yield (Yadukumar & Rejani, 2008).

6.2.3 Lack of access to Extension Officers

Getting the services of Extension officers in the Upper West Region is difficult and almost impossible. In the DBI district for instance there are only two extension officers in the whole district and considering the number of communities the district has, which is 34 in number, the Extension Officers are required to go through all these communities to render their services. This is usually not effective considering how delicate the cashew plant is. Wongnaa (2013) purports that among other factors, cashew farmers should have adequate access to extension services in order to improve their knowledge and skill of farm management.

6.2.4 Lack of storage facilities

Storage in Agriculture is simply the act of keeping farm produce safe after harvest before taking it to the market for sale or any further process. Storage facilities are simply infrastructure that are built primarily to keep farm produce before selling or supplying the produce. Examples of some storage include barns, jute bags, silos among others. Ensuring effective storage system for farm produce is of high significance in enhancing growth and development of the agricultural system in Ghana.

The most important function of an effective storage system is to keep farm produce safe especially the perishable ones. In addition, storage provides the following benefits; storage helps in the stabilization of price adjusting demand and supply, and also provides employment and income through price advantages, among several others.

However, the above advantage cannot be realized by cashew farmers in the Upper West Region as a result of the setbacks they face regarding storage facilities, hence affecting the production of cashew nuts on a large scale. Without functional storage facilities, the farmers are forced to

either produce on a small scale or produce on a large scale and sell at a very cheap price, therefore making little or less profits hence adversely affecting income of farmers.

In a study conducted by Gyedu-Akoto, (2014), the author disclosed in his findings that 76.1% of cashew farmers had no storage facilities and this affected the quality of the cashew nuts. Most of these farmers only harvest their cashew nuts based on quantity demanded by their buyers.

Because of the lack of storage facilities, some farmers store harvested cashew nuts in their local thatch huts. This method of storage is not appropriate for cashew nuts because there is high tendency of the nuts losing weight and quality.

6.2.5 Lack of technological equipment

From the research findings, it is important for cashew farmers to have adequate technological equipment's as well as be equipped with the skills to ensure that full value of cashew nuts is obtained. Cashew fruits are usually wasted away in the DBI district due to the absence of processing equipment's to put it into use. During the study, the researcher observed that some cashew farmers in the communities were being innovative with the cashew fruits, as some of the farmers were trying to locally produce flour from the cashew fruit which can be used in preparing healthy porridge beverages, and other products. More also, a study by Jadhav & Kolhe.P, (2017) disclosed that one of the cashew technological machine known as tractor mounted hydraulic lifter is available. According to him, it is a well-equipped and sophisticated modern machine used for spraying, harvesting, and pruning of the cashew plant. And acquiring a machine like this in cashew growing areas will be of great support and advantage to farmers. Cashew farming is labor intensive and as such manual activities like harvesting by using a machete, employing labor to spray cashew field and climbing of the cashew tree to hand-pick the

fruits will be carried out by the machine and as a result reduce cost while increasing operational efficiency.

6.3 A recommended cashew nut supply chain that can be adopted

An effective supply chain should exhibit characteristics such as efficiency and responsiveness to improve the entire process of a company's or organization's operations. The existing cashew nut supply chain in the Upper West Region, Figure 5.2 is cumbersome and faced with some challenges evident from the research findings and as such leads to issues like:

- Delay in the acquisition of raw materials for production
- Access to market
- Absence of transparency
- Delay in the supply of produce to customers
- Low quality cashew nuts

The proposed model below can be adopted by stakeholders in the cashew sub-sector to address each process of the cashew supply chain from upstream (production) to downstream (Marketing). Similar models are being implemented by some cashew growing countries in various areas of agriculture and is explained in detail in the context of this study. This model however, is in the form of an input and service credit scheme. This means that, if various stakeholders adopt this, they can decide to run this as a credit scheme to farmers that renders all or some of the services on the model to the farmers on credit basis. At the end of harvest, the investor has a stake as well as the farmers, and that will depend on the agreement both farmers, and investor or investors have.

A comprehensive supply chain should be more detailed in providing directions as to what needs to be done at every step of the chain. This will ensure a faster and more responsive supply chain. This supply chain follows the idea of the SCOR model and carefully presents step by step activities that can be carried out at every stage. Also, this model was tested by the researcher on two hundred small holder farmers in the Sissala East district of the Upper West Region under the Savannah Agricultural Productivity Improvement Project (SAPIP) but in the area of maize production in 2021 and it chalked positive results. Comparing this model with the current supply chain in the region, cashew farmers get to enjoy some benefits including:

- Easy flow of communication
- Easy access to extension services
- Farms are insured to mitigate against natural disasters
- Access to markets
- Higher incomes
- Improved lives of small holder farmers

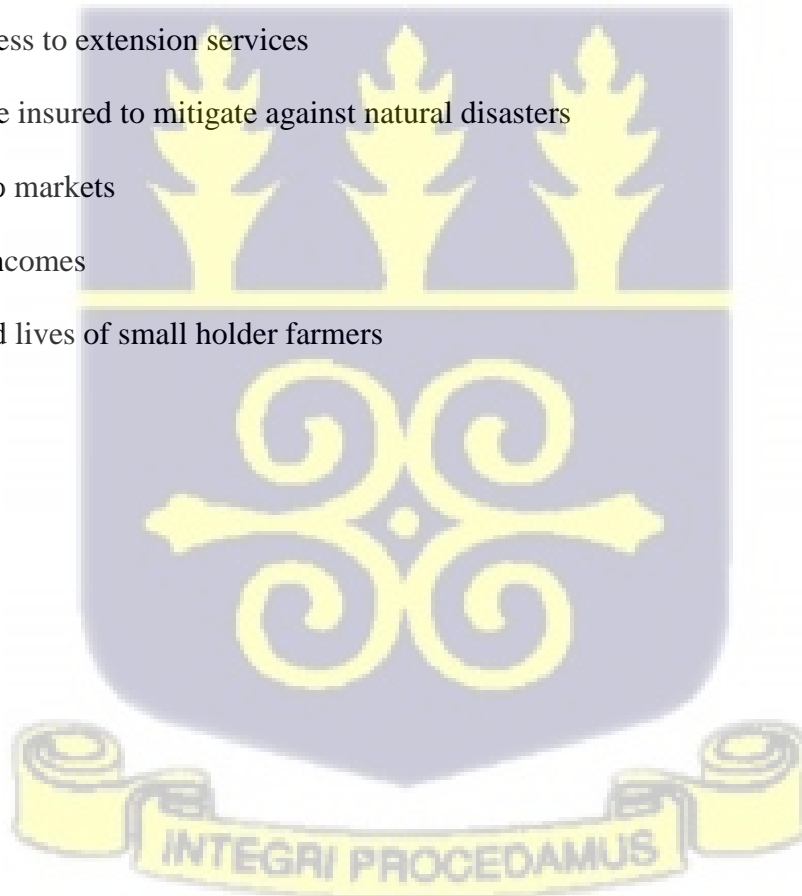
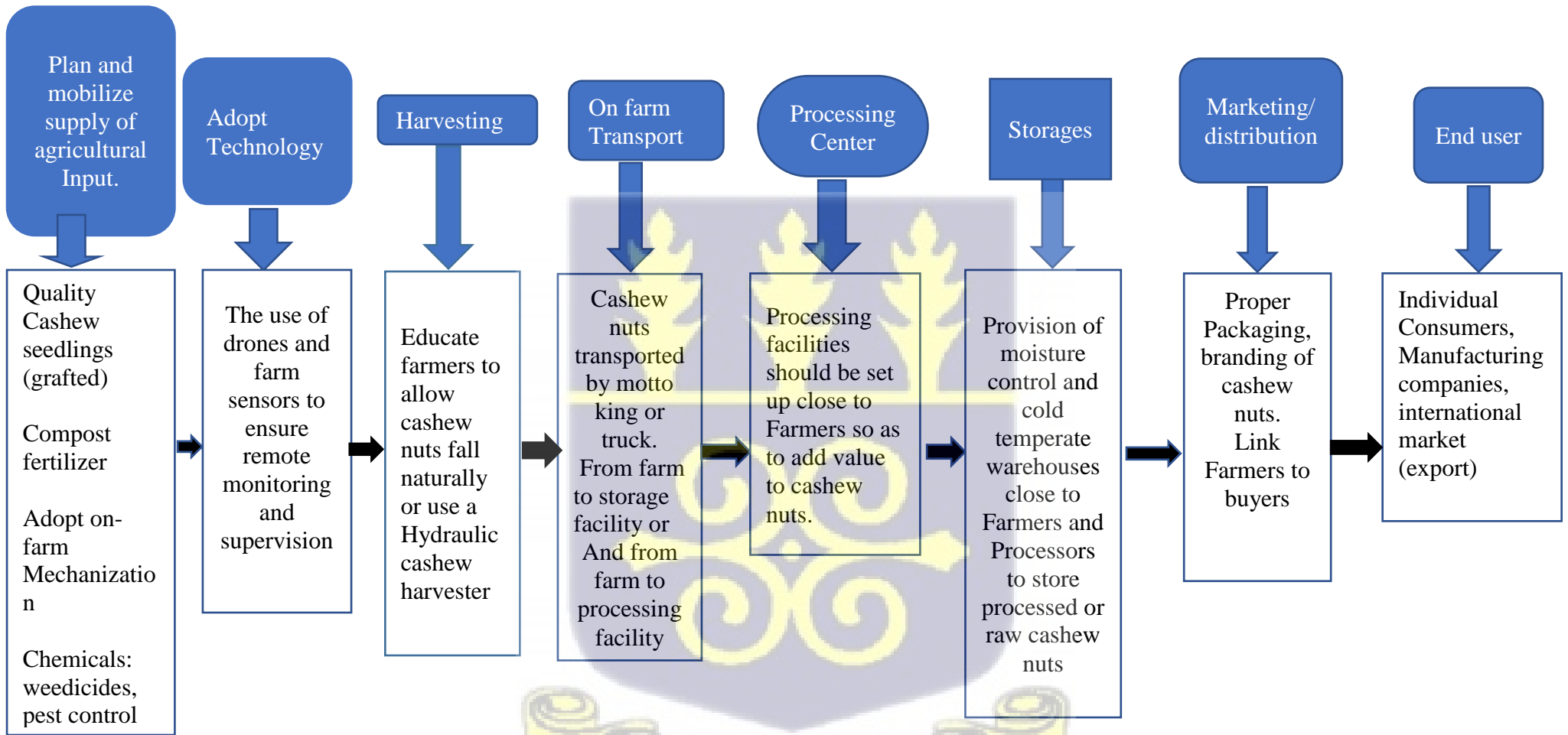


Figure 6.3 A proposed cashew supply chain model



Source: Author's Construct, 2021

6.3.1 Plan and mobilize cashew farmers under one group

In the first place, planning is a key aspect to succeed in anything and in this case, planning will include surveying and identifying an area with many active cashew farmers as well as potential farmers who are serious and hardworking. Depending on financial capacity, one can decide to begin with maybe 20 or less or more farmers and mobilize them under one group. This will ensure proper and easier coordination. A meeting can then be held with them to discuss intentions of working with them and reach a conclusion and agreement with the farmers. They can now be registered unto a database system by taking their names, maybe ages, gender, number of acres each farmer can cultivate and any other important detail. After the registration, trainings or workshops should be held for the farmers to abreast them with good agronomic farm practices, importance of record keeping and so on. This will also solve the issue of farmers carrying out their activities independently without any external advice especially considering the fact that majority of these small-scale farmers have no formal education as revealed in the findings of this study resulting in their facing challenges as is done in the current supply chain. When farmers are put in a group and they work together, it is easier for them to have access to international support. For instance, Canada in collaboration with the MoFA supported a women group in Shea nut production with processing equipment, motto kings, to enhance their production in Kojokperi in the Daffiama-Bussie-Issa district. The market-oriented agriculture programme (MOAP) under the regional (Upper West) department of the Ministry of Food and Agriculture (MoFA) supports and trains small scale cashew farmers in bee keeping which is currently running (2021). According to them, spraying cashew trees with chemicals will hamper

fruiting of the cashew plant and bees have been found to be good pollinators aiding the development of well matured cashew fruit, amongst several other opportunities.

6.3.2 Production

Depending on the number of farmers registered, the required quantity of input resources each farmer needs for cultivation should be supplied to them on time, at least two weeks prior to the planting period (July to August) to ensure good yield. There is also the need to enhance effective supervision and monitoring by deploying technical personnel to ensure that the farmers are doing the right thing to avoid post-harvest losses and achieve high quality and quantity of cashew nuts during harvest to establish a “win, win” situation for both Farmers and Investors.

6.3.3 Transportation

Cashew nuts are delicate and as such need to be transported in the right way to maintain their weight and quality. In the current supply chain women pick the fallen nuts in pans and carry on their heads to various location points. But with this model, the investor already has the number of farmers in a group and because they will want to avoid losses, customer dissatisfaction, proper means of transport like mini Trucks, good Motorbikes will be used to transport the produce.

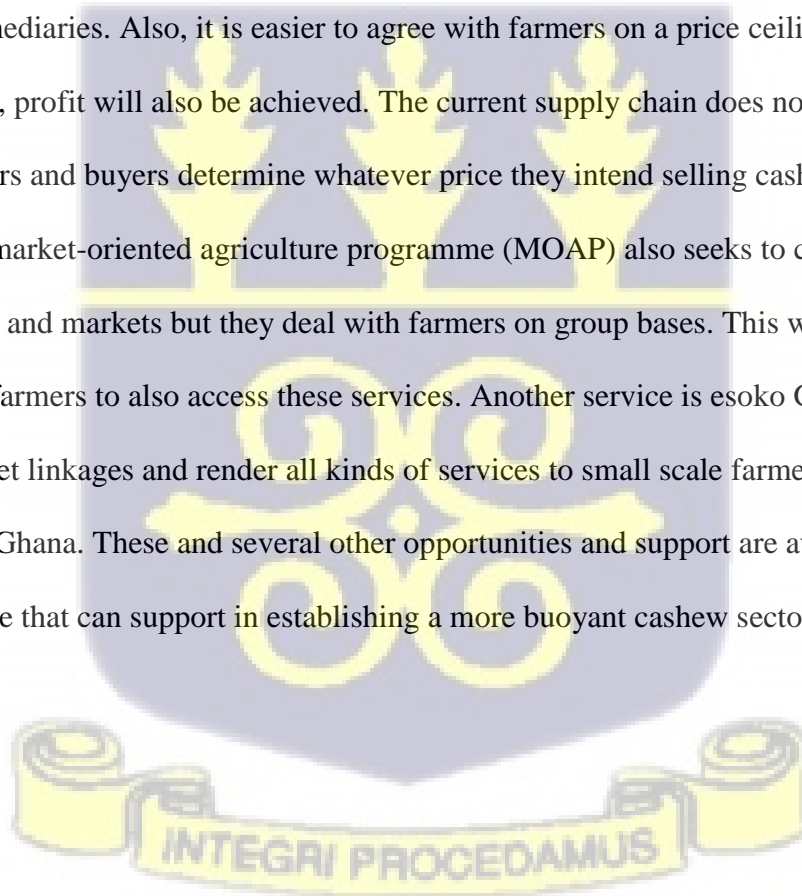
6.3.4 Storage

In the current cashew supply chain, Figure 5.2, cashew farmers have no effective storage facility and most of them leave harvested cashew nuts on their farm fields. But with this, an effective cold moisture storage facility, preferably close to their farms. will be provided for farmers to keep harvested cashew nuts. This will help maintain the moisture content and quality of cashew

nuts as well as cater for inventory. The cashew nuts will be bagged in hermetic storage bags to protect against external and internal insect attacks. This will enable the nuts to last in storage for about two years.

6.3.5 Marketing

This model will solve the problem of access to market and hence improve the earning of good profit to a large extent. This is so because since farmers are in a group, it will be easier and safer for buyers to get cashew nuts straight from the group. Most exporting companies like Olam, Alphonsah cashew, Jorom commodities, prefer buying cashew nuts directly from farmers rather than from intermediaries. Also, it is easier to agree with farmers on a price ceiling to sell the nuts. In this way, profit will also be achieved. The current supply chain does not have that as individual farmers and buyers determine whatever price they intend selling cashew nuts and to any buyer. The market-oriented agriculture programme (MOAP) also seeks to create linkages between farmers and markets but they deal with farmers on group bases. This will be an opportunity for farmers to also access these services. Another service is esoko Ghana, and they also create market linkages and render all kinds of services to small scale farmers in communities in Ghana. These and several other opportunities and support are available in the agricultural space that can support in establishing a more buoyant cashew sector in Ghana.



CHAPTER SEVEN

CONCLUSION

7.0 Introduction

This thesis sought to examine the supply chain of cashew nut in Ghana. with the objectives being to ascertain the processes involved in the cashew nut supply chain in the Upper West Region, discover challenges involved in the production and marketing of cashew nuts in the Upper West Region and to recommend a supply chain model on how the operations management of the supply chain of cashew nuts can be improved to maximize profit. The Daffiama-Bussie-Issa District in the Upper West Region was selected for the study. The DBI District was an appropriate location to conduct the research because the district has been characterized by immerse cashew production in recent years. To have an in depth understanding of activities involved in cashew production in Ghana, actors in the cashew supply chain were involved in the study, and they included; cashew farmers from five selected communities in the DBI district in the Upper West Region, Middlemen or Aggregators and selected Exporters of cashew nuts in Ghana. These study participants were engaged in various ways to solicit their views and ideas about cashew production. This chapter gives a summary conclusion on the findings of the study, some recommended policies, limitations as well as areas that have been recommended for further studies.



7.1 Conclusion

From literature, statistics by the Food and Agricultural Organization (FAO) estimate that more than 60 percent of the world's population depends on agriculture for a livelihood (Zavatta, 2015). With the production of cashew gaining grounds in the savannah regions, (Northern, Upper West and Upper East regions of Ghana), the big question is whether the cashew sub sector could be revamped and restructured to function like cocoa and thus serve as a cash crop that could help improve the income level of farmers especially in the rural areas. A supply chain can simply be described as the downstream and upstream flow of goods and services. In the case of cashew nut supply chain, majority of activities are centered in the downstream which has to do with the farmers. Apparently, farmers have not considered the sustainability aspect of their activities, evident in the recurrent bushfires and over grazing by cattle belonging to the fulani herds men in the DBI district. The study also revealed processes cashew farmers go through in acquiring farm inputs to undertake their farm activities, as well as processes the middlemen and Exporters go through to buy and transport the cashew nuts to various destinations or location and how their indulgence in the business of cashew has contributed to their socio-economic well-being. They also raised several challenges they go through in the process of farming and buying the cashew nuts. Based on that, the researcher sort for their opinions on how these challenges they encounter could be addressed to enable them carry out their operations more efficiently.

These findings are summarized in figure 7.1 and table 7.2 below.

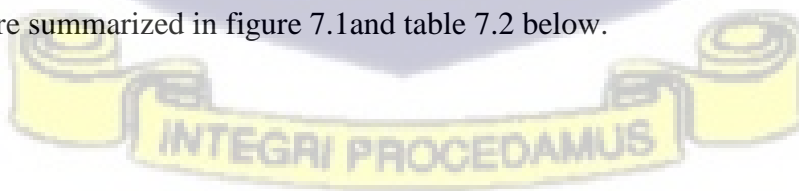


Figure 7.1 Processes involved in the supply chain of cashew nuts in the Upper West Region.

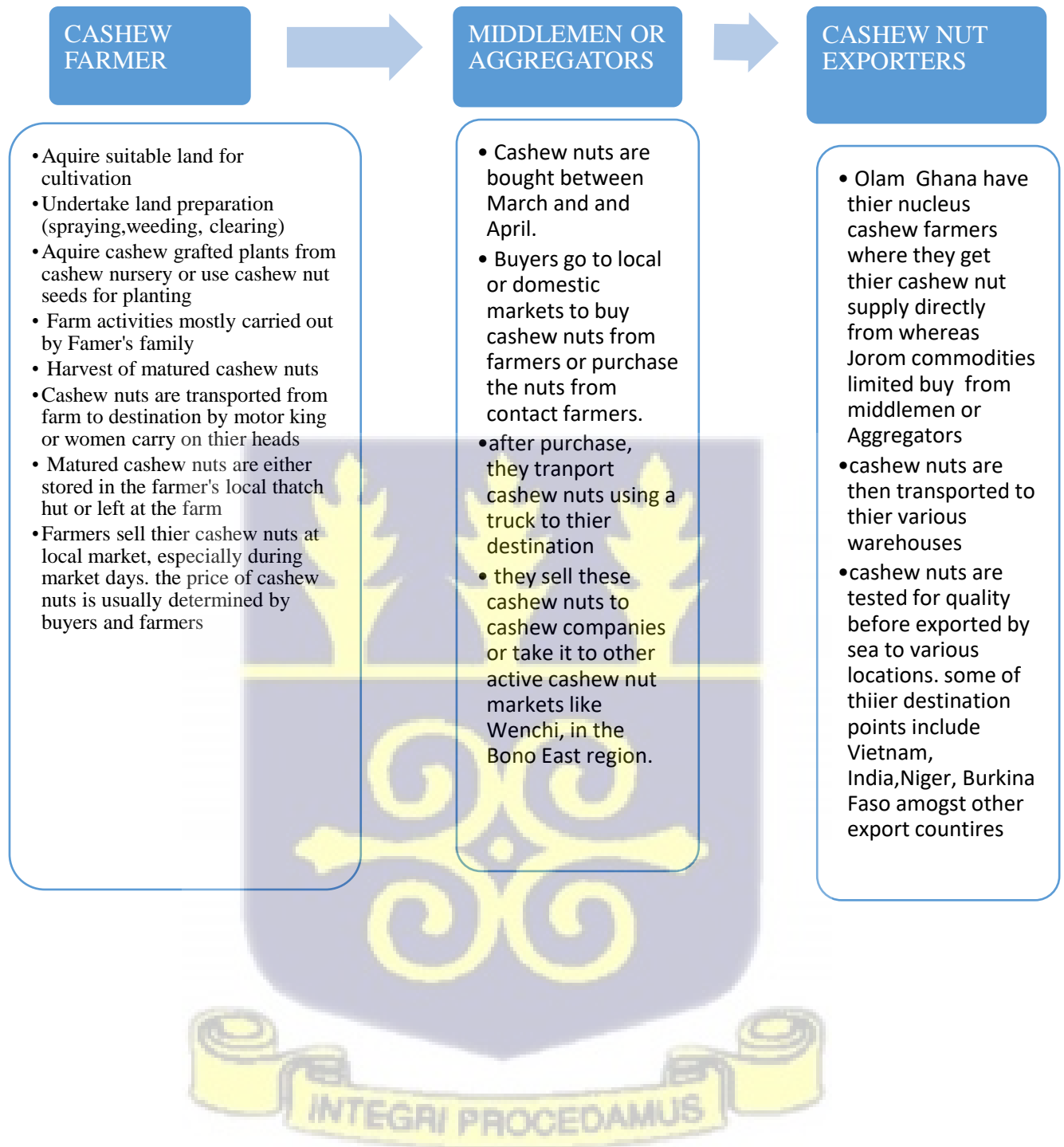


Table 7.2 (a) Challenges Cashew Farmers face.

Challenges faced by cashew Farmers
<ul style="list-style-type: none">• Lack of extension services Cashew farmers find it difficult to access extension services to enable them apply good agricultural practices in order to obtain good yield and quality.• Price instability The absence of a stable price for cashew nuts like that of cocoa, usually leads to a banter between buyers and farmers as each one has a price they intend to sell.• Lack of storage Cashew nuts are usually left wasting away on the ground, or left at the mercy of bushfires and theft due to inadequate storage facilities. Cashew nuts ought to be stored in well ventilated and spacious warehouses to ensure an appropriate moisture content and maintain quality.• Lack of irrigational systems Harmattan or dry season is common in the savanna areas, thus Upper west, North East, Northern and Upper East regions, with only one rain season. Hence the need for irrigational systems to cater for the dry weather to ensure continuous growth of plants even during the dry weather.• Ineffective cashew plants Most farmers, especially those who went in for the free cashew seedlings, complained the plants were not fruitful, slow in growth and easily attacked by pest. This compels them to spend extra cost on the plants just to enhance its growth and this is intended to yield income in two to three years which is the normal way, but rather yields in five or more years' time. This causes most of these farmers loose interest in the plants but instead cultivate it to serve as fire breaks their farms while they concentrate on other crops such as maize, beans, soya bean, rice and yam.

Table 7.2 (b) Contributions of Cashew to their livelihood.

Contributions of cashew to farmers
<ul style="list-style-type: none">• Increased the income levels of farmers. From the study, it was discovered that majority of the farmers confirmed the economic potential of the crop and their ability to afford some basic needs and educational needs of their families.• Cashew plants have the ability to sustain the environment. Cashews contribute to soil fertility, it is also an appropriate plant for afforestation. Basically, cashew plants grow into trees and are used for economic purposes and can also control the environment from degradation, loss of soil fertility and so on. But that will also depend on the human factor to take care of the trees.

7.2 Policy Recommendations

To avert most if not all the challenges confronting the cashew nut supply chain, these suggested points could be implemented by government and other stake holders in the cashew sub sector to enhance performance of the sector and make it more attractive for other investors, who are looking to go into the cashew sub sector in Ghana.

- ❖ Cashew farmer co-operatives should be strengthened to work well in order to promote group selling of cashew nuts. This will also aid in creating linkages between value chain players in the cashew sector to create sustainable business relationships.
- ❖ The issue of pricing decisions of cashew nuts should be subject to review and also the process of pricing is subject to economic analysis, by way of taking into consideration the volatile nature of the international markets and therefore ready to buffer the producers of cashew nuts from shocks.

- ❖ In view of the nature of price instability of cashew nuts, government should promote processing of cashew nut to create readily available markets for producers by inviting equipment's manufacturing companies to set up cashew machine manufacturing in Ghana and providing tax exemptions on VAT (value added tax).
- ❖ Governments should construct warehouses in the various cashew producing communities through the commodities exchange, Ghana export promotion authority and other government agencies, to solve the problem of storage.
- ❖ Governments and other stakeholders in the cashew sub sector, can institute an annual "Cashew Day" every January of the year to launch the cashew season in Ghana.

7.3 Recommendations to improve operational efficiency of cashew supply chain.

Majority of the farmers from Tabiesi, Issa, Wogu, Fian and Owlo communities who were interviewed, had commended the Ghana export promotion authority represented by the cashew industry association of Ghana for their free three months mass spraying of cashew plants every year to curb pest infestation. However, they still beckon on various stakeholders of the cashew sub sector to provide them with more chemicals, storage facilities as well as the ease to access credit facilities to ensure effective run of their farm activities. Price instability is also of great concern to the farmers and other stakeholders involved in the production of cashew nuts, as such it needs to be tackled to ensure smooth run of the sub sector just like is done in the cocoa industry.

The regional leadership of cashew industry association of Ghana (CIAG) suggested that, members of the Tree crop board should be made up of those who have in depth knowledge and understanding of cashew nuts and are well experienced in the cashew sub sector to enable them empathize better with cashew farmers. Tree crop development authority (TCDA) was inaugurated on the 29th of September 2020 to regulate all issues concerning tree crops including

cashew farmers in the country. In a Statement made by the minister for food and Agric during his ministerial vetting on 19th February 2021, pointed out that the TCDA is one of the entities set up by the government of Ghana to oversee issues regarding tree plantations such as mango, coffee, cocoa, and cashew but the authority is not fully operational. Currently, majority of farmers of these crops are small holder farmers and hence it will be difficult for a country like Ghana to meet demand in the international market. Also, there are no adequate resources such as extensive research and technology to ensure success of the cashew sub sector. Other countries such as Cote d Ivoire have well-developed tree crop sector contributing to the success of their cashew industry.

More also, the provision of technological equipment's to enhance cashew production cannot be overemphasized. Suitable technologies should be provided and decentralized in other cashew growing areas like the Upper West Region and not concentrated in the Bono East and Ahafo Regions of Ghana. The provision, adoption and implementation of technologies by farmers and their access to effective extension services can influence the growth of cashew productivity. In addition, Jadhav (2017) identified a cashew technological machine known as tractor mounted hydraulic lifter. According to him, it is a well-equipped and sophisticated modern machine used for spraying, harvesting, and pruning of the cashew plant. Acquiring a machine like this in cashew growing areas will be of great support and advantage to farmers. Cashew farming is labor intensive and as such manual activities like harvesting by using a machete, employing labor to spray cashew field and climbing of the cashew tree to hand-pick the fruits will be carried out by the machine and as a result reduce cost while increasing operational efficiency. From the research filed, some cashew farmers were becoming innovative with cashew apples which they locally produce into flour and training of cashew farmers by some private NGOs on the

processing of cashew apples was ongoing at the time this research was undertaken. Most of the farmers revealed the nutritional and health benefits of the cashew fruit or apple and therefore called on government to support them with the necessary machinery and technological equipment so they can obtain full value of the cashew crop. This will lead to increase in production of quality cashew nut to meet supplies demands.

In addition, supply chain enablers like information technology should be adopted since activities of the actors in the cashew supply chain are interlinked. This will ensure efficiency and help minimize challenges that come with the supply chain like information distortion. Building inventory is also critical in enhancing supply chain efficiency hence the provision of suitable warehouses or storage should be considered.

Some exporters of cashew nuts who were involved in the study called on government to, through research, improve on planting materials in order to obtain high yield of the cashew crop. They added that farmers should be given planting materials for free especially when the cashew crop has a massive economic benefit that generations could rely on.

Farmers should also be trained on the proper maintenance of their cashew field and to ensure that post-harvest treatment of nuts are enforced by government to make sure that cashew nuts are dried properly before sale. This will go a long way to increase productivity of farmers and as such contribute to socio-economic development. Wongnaa & Vitor-Awunyo (2013) pointed out the need for potential investors, Non-governmental organizations as well as government to channel investments in the cashew sector to enable farmers increase their production capacities.

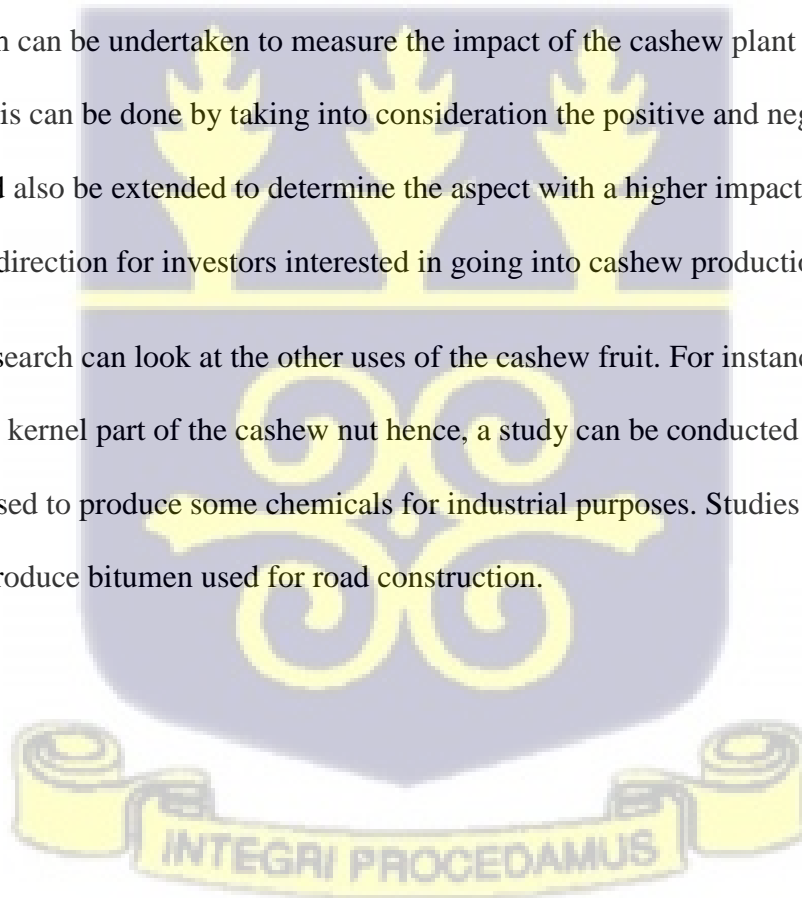
7.4 Recommendations for further study

Processing of cashew is a new area that is evolving in the Upper West and Northern Regions, hence further study could be conducted to test farmers' perception and readiness to also go into processing. This is necessary because it will require that farmers go into large scale production of cashew nut.

Also, this study concentrated on the supply chain aspect of cashew nuts, hence further research can look at the value chain sector. Because if we are working to achieve a more buoyant and active cashew industry, then it is prudent to take every aspect of it into consideration.

Again, a research can be undertaken to measure the impact of the cashew plant on the environment. This can be done by taking into consideration the positive and negative aspect of the crop. It could also be extended to determine the aspect with a higher impact over the other. This will give a direction for investors interested in going into cashew production.

Finally, other research can look at the other uses of the cashew fruit. For instance, ethanol is derived from the kernel part of the cashew nut hence, a study can be conducted to determine how ethanol can be used to produce some chemicals for industrial purposes. Studies say that ethanol can be used to produce bitumen used for road construction.

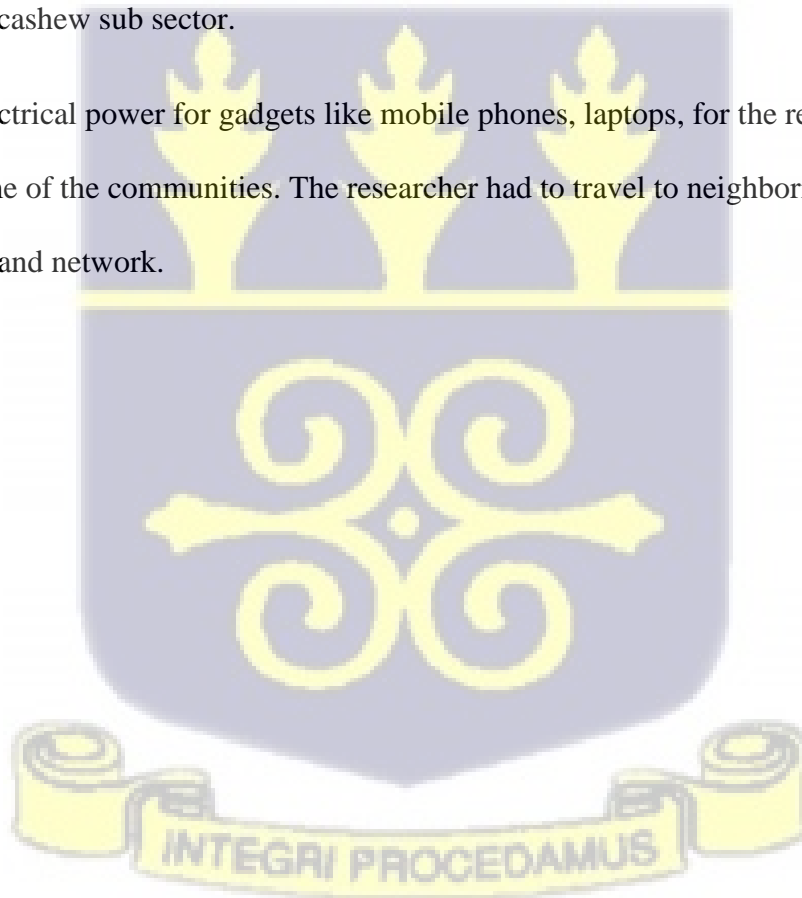


7.5 Limitations of the study

Most of the respondents had not attained formal education and this made it difficult to explain some of the questions on the interview guide to them. But the research had to employ the services of a second person who was fluent in the native language and English as well, which made the process less cumbersome.

In addition, inadequate resources and funding limited the scope of this research. There are a lot of cashew growing communities in the Upper West Region, and as such all these communities could have been involved in the research so as to get a holistic view and a deeper reflection about the status of the cashew sub sector.

Also, getting electrical power for gadgets like mobile phones, laptops, for the research was a challenge in some of the communities. The researcher had to travel to neighboring communities to access power and network.



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APPENDIXES

INTERVIEW QUESTIONS FOR FARMERS IN THE D-B-I DISTRICT

DATE

NAME OF COMMUNITY.....

IDENTIFICATION.....

DEMOGRAPHIC DATA

1. Gender: a. Female [] b. male []

2. Which age group do you belong to ?

a. below 18 [] b. 18-25 years [] c. 26-35 years [] d. 36- 50year [] e. above 50 years []

3. What is your educational level?

a. No formal education [] b. Primary [] c. JHS [] d. SHS [] e. Tertiary [] f. informal education []

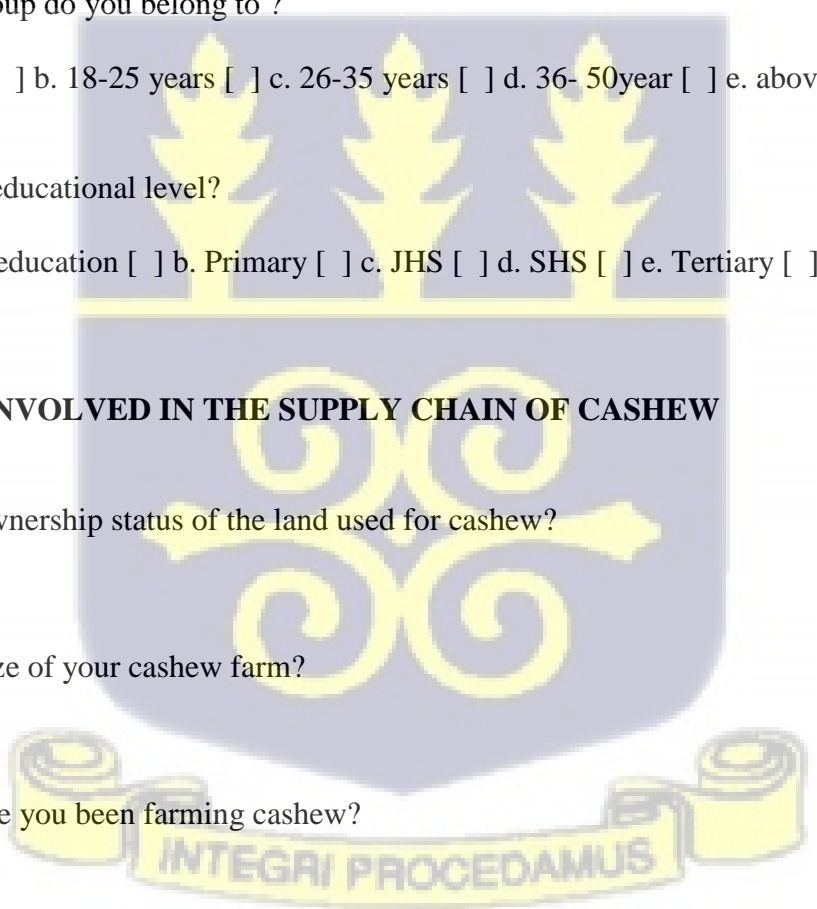
PROCESSES INVOLVED IN THE SUPPLY CHAIN OF CASHEW

4. What is the ownership status of the land used for cashew?

5. What is the size of your cashew farm?

6. How long have you been farming cashew?

7. How do you get cashew seedlings to plant?



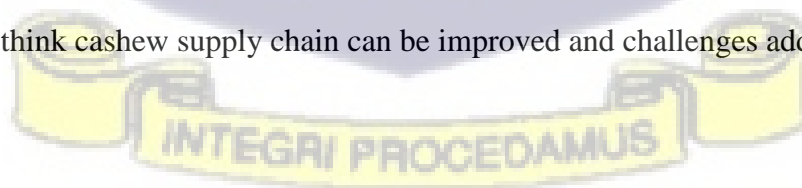
8. How do you carry out your farm activities?
- 9.. How many bags of the raw cashew nuts do you harvest on yearly basis?
10. How do you store harvested cashew nuts?
11. How is price of cashew determined?
12. How do you mostly sell your cashew produce?
13. Is cashew farming your main source of income? /
14. What other source of income do you have?
15. In what way is cashew farming of benefit to you?
16. What kind of supports or initiatives have you received to boost your cashew farm?
17. Are the cashew farmers in this community organized into an association?

CHALLENGES FACING CASHEW SUPPLY CHAIN

18. Can you tell me some challenges you face as a farmer?

WAYS CASHEW SUPPLY CHAIN CAN BE IMPROVED

19. How do you think cashew supply chain can be improved and challenges addressed?



INTERVIEW QUESTIONS FOR MIDDLEMEN IN THE D-B-I DISTRICT

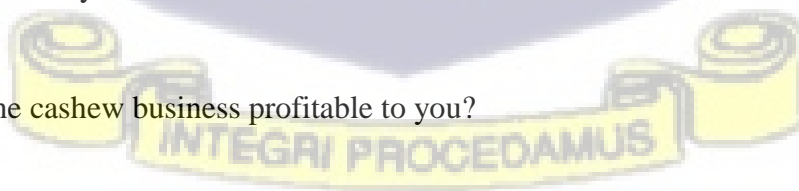
DATE

NAME OF COMMUNITY.....

IDENTIFICATION.....

PROCESS INVOLVED IN THE CASHEW SUPPLY CHAIN

1. In total, how many bags of cashew do you buy from the Daffiama-Bussie-Isaa district?
2. How is the price of cashew determined?
3. Which of the communities do you buy large quantities of cashew nuts from?
4. Do you reach your optimum quantity of cashew nuts?
5. How long does it take you to buy or reach your total quantity of cashew nuts?
6. How do you transport the purchased cashew nuts from the village?
7. Where do you sell the cashew nuts you buy?
8. Whom do you sell the cashew nuts to?
9. Is the cashew business profitable to you?



CHALLENGES INVOLVED IN THE MARKETING OF CASHEW

1. Are you the middlemen in any form of association?
2. Can you tell me some problems you encounter when buying, selling, or supplying the cashew nuts?

STRUCTURED INTERVIEW QUESTIONS FOR EXPORTERS OF CASHEW

DATE

NAME OF COMPANY.....

POSITION

PROCESSES INVOLVED IN THE CASHEW SUPPLY CHAIN

1. Which division are you?

RESPONSE

2. How long have you been in the business of cashew exportation?

RESPONSE

3. How are the prices of cashew determined?

RESPONSE

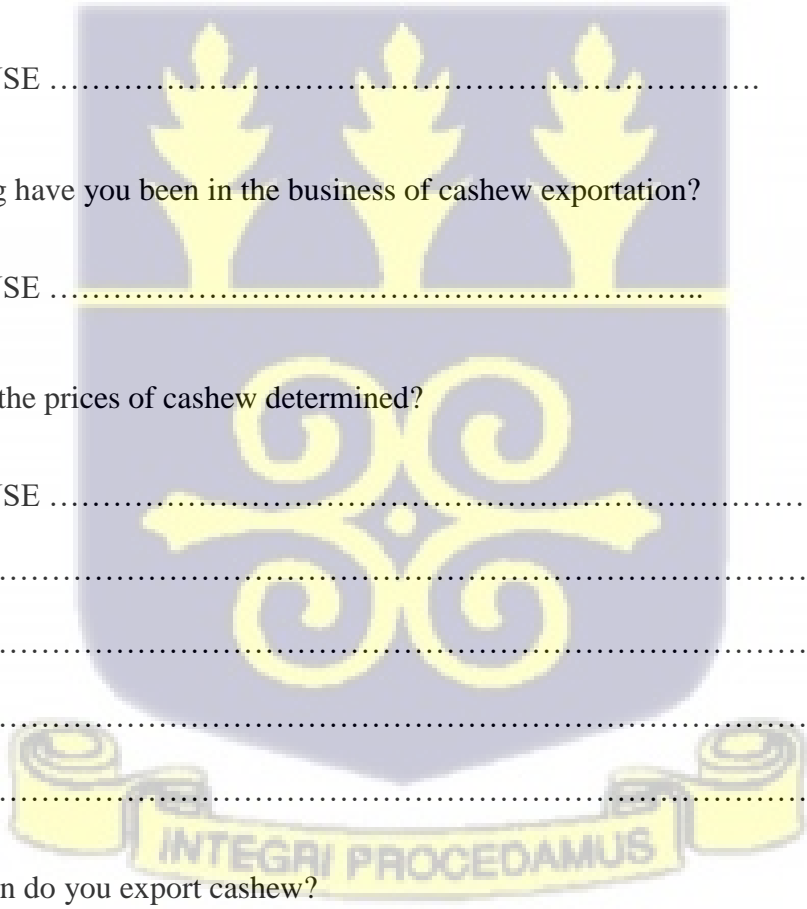
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4. How often do you export cashew?

RESPONSE



5. Where do you receive your cashew nuts supply from?

RESPONSE

6. How much quantities of cashew nuts do you exported?

RESPONSE

7. Does local supply of cashew nuts meet your demand?

RESPONSE

8. Do you meet demand of cashew nuts in the international market?

RESPONSE

9. Where are the cashew nuts stored before they are exported?

RESPONSE

10. How long are the cashew nuts stored before they are exported?

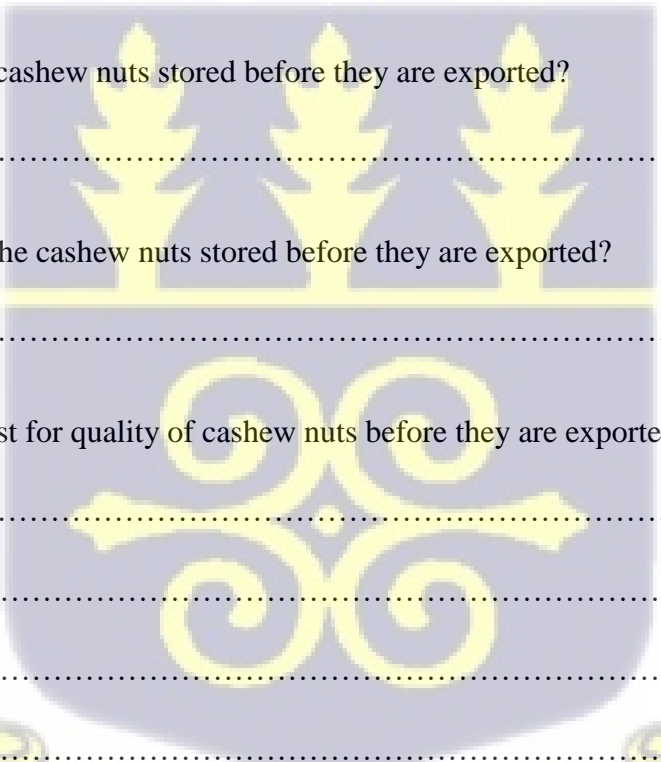
RESPONSE

11. How do you test for quality of cashew nuts before they are exported?

RESPONSE

12. By what means are the cashew nuts exported?

RESPONSE



13. How long does it take you from the time of purchase to export?

RESPONSE

.....

14. How do you track arrival of the consignment?

RESPONSE

.....

.....

15. Where are your export destinations?

RESPONSE.....

.....

16. How important is cashew nut to Ghana's economic development?

RESPONSE.....

CHALLENGES INVOLVED IN THE MARKETING OF CASHEW

1. What challenges do you encounter as an exporting company of cashew nuts in Ghana?

RESPONSE.....

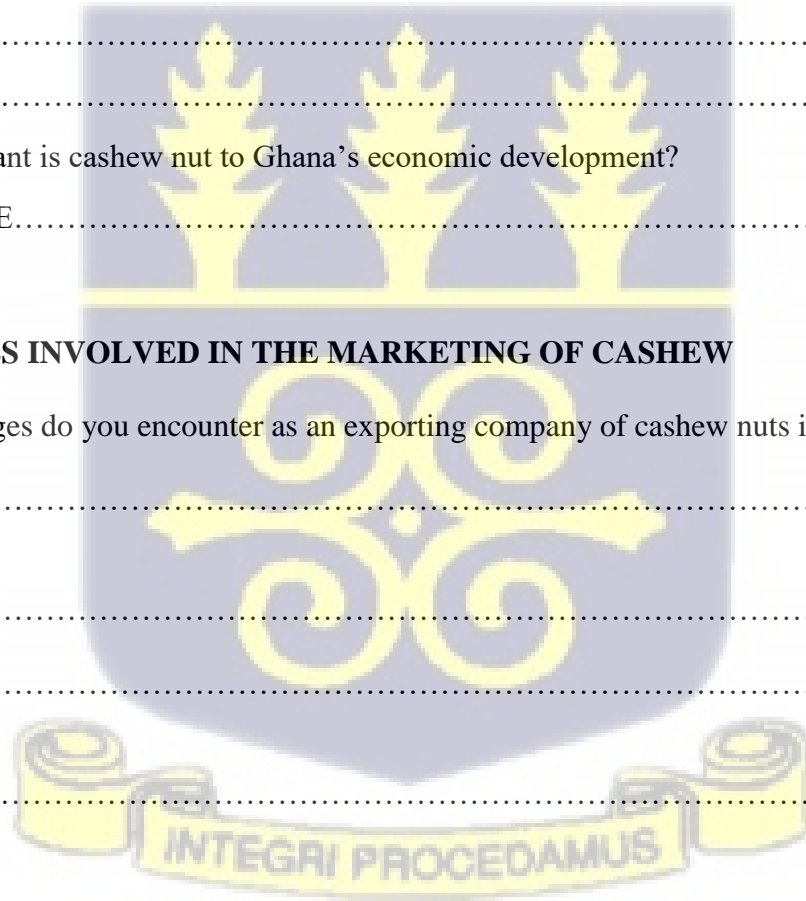
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RECOMMENDED WAYS THE OPERATIONS OF CASHEW SUPPLY CHAIN CAN BE IMPROVED

1. What role can the government play in ensuring sustainable production and supply of cashew in Ghana?

RESPONSE.....

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